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Paints, Colours, Varnishes, Glazes and Lacquer; Painting, Colouring, and Varnishing.—E. Yates, 2202. W. H. Elphick and H. Hobbs, 2230.

Paper, Pasteboard, and Papier Mâche; Paper Hangings.—W. R. Lake (com.), 2017. H. B. Wingett, 2067. W. Conquest, 2110. J. K. Martin, 2210. A. M. Clark (com.), 2236. F. Ransome, T. M. Gray, and F. Smith, 2322. H. S. Aumonier, 2340.

Petticoats, Skirts, Wearing Apparel for Ladies, Dress Suspenders, Collars.—A. J. Heys, 2007. E. P. Alexander (com.), 2081. C. Deguingand, 2339.

Pins and Needles.—H. Aydon, 2042.

Pipes, Tubes and Syphons; Joining Pipes.—W. R. Lake (com.), 2017. C. W. Torr, 2080. A. M. Clark, (com.), 2226. W. R. Lake (com.), 2371. D. L. Selkirk (com.), 2374.

Pistons and Piston Packings.—W. Rowan, 2013. E. Turner, 2207. J. G. Cameron, 2302.

Ploughing, Digging, Clod Crushing, Land Rolling, Harrowing, Agricultural Implements, Tilling and Cultivating Land.—C. H. Plowright and W. S. Reynolds, 2023. T. Perkins, 2037. J. W. Wagstaff, 2145. F. C. Lake, 2153. J. H. Johnson (com.), 2191. H. Denson, 2377.

Preserving and Hardening Wood, Metal, Stone, &c.—J. Taylor, 2375.

Preserving and Preparing Articles of Food.—W. R. Lake (com.), 2032. A. C. Collineau and M. E. Savigny, 2257. W. Meek, 2263. W. Morgan-Brown (com.), 2270. R. Adam, 2326. J. Taylor, 2375.

Presses; Compressing.—C. H. Gill (com.), 2090.

Printing and Transferring; Type and other Surfaces for Printing, Composing, and Distributing Type.—G. A. Thompson, 2027. H. Dewhurst, 2197. E. A. Cowper, 2209. R. W. Wilkinson and C. J. Wallis, 2254. C. G. Squintaini, 2329. J. H. Johnson (com.), 2341.

Propelling Machinery, Transmitting Power and Motion, Converting Movements.—R. R. Gubbins and J. Whitestone, 2190. J. Barraclough, 2233. A. C. Alliot, 2308. J. C. Reuter, 2320.

Propelling Ships, Propellors, Paddle-wheels, and Screws.—L. Thomas, 2293. J. J. Kunstadter, 2294. Hon. R. C. Parsons, 2331. J. W. Sadler, 2395.

Pulleys.—C. Toope, 1992. W. R. Lake (com.), 2124. J. Barraclough, 2233. J. C. Reuter, 2320. F. Ley, 2384.

Pumps, Pumping and Raising Water and other Liquids, Pumps, Pistons, and Packing, Ships Pumps, Beer Engines.—P. Burt, 2128. A. F. Eells and S. C. Lond, 2269. Hon. R. C. Parsons, 2330.

Purses and Purse Fastenings.—M. M. Franzini, 2296.

Railways, Permanent Way, Rail Joints, Chairs and Sleepers, Portable Railways, Atmospheric Railways, Switches, Points, Crossings, and Turnables.—W. E. Gedge (com.), 1988. H. Horstman, 2064. H. Gardner (com.), 2101. W. R. Lake (com.), 2124. W. R. Lake, (com.), 2140. H. R. Shaw, 2152. A. S. Moss, 2161. G. Levick, 2174. P. Bourgin, 2309. G. Stevenson, 2333.

Railways, Carriages, Coupling, Uncoupling, and Altering Position of Carriages and Engines.—J. Morris, 2029. W. F. Heshuyen, 2063. A. S. Moss, 2161. W. R. Lake (com.), 2140. G. Stevenson, 2333.

Reaping, Mowing, Making Hay, Gathering in Produce.—W. Wilson and W. Isherwood, 2256. W. N. Nicholson and W. Mather, 2275. P. Jensen (com.), 2306.

Reflectors for Lamps, Reflection of Light.—F. A. and F. Hamilton, 2295.

Refrigerating, Cooling Liquids, Making Ice.—B. J. B. Mills (com.), 2276. A. C. Jeffrey (com.), 2321. W. T. Reed, 2364.

Registering, Indicating, and Marking.—H. Aydon, 2042. H. Pottin, 2076. F. Delvri, 2147. R. Murray, 2171. P. Jensen (com), 2187. E. G. Brewer (com.), 2282. A. M. Clark (com.), 2348.

Retorts and Crucibles, Melting Pots.—J. Newman, 2238. S. Pitt (com.), 2281.

Roadmaking and Paving, Cleaning Streets.—T. Madderson and B. Wilkinson, 2096. C. M. Lloyd, 2219. T. S. Bale, 2259. J. W. Dennison, 2363.

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Ropes, Cordage, Twine, Oakum, Wire Ropes.—L. Binns, 2159. J. G. Garrard, 2203.

Safes, Strong Rooms, Safety Vaults, Money Tills.—H. J. Crossle, 2060.

Salt and Saltpetre.—J. H. W. Biggs, 2106.

Sewing and Embroidering.—H. H. Murdoch (com.), 2000. T. Low, 2019. H. Wollenberg and J. Priesner, 2059. S. Pitt (com.), 2271. T. Morgan (com.), 2347.

Shears, Scissors, Clipping and Shearing Animals.—J. C. Mewburn (com.), 2167.

Ship and Boatbuilding.—T. Booth, 2136 J. Cox, 2139. H. F. Joel, 2175. H. J. Haddon (com.), 2200. L. Thomas, 2293. J. T. Parlour, 2351. H. Studdy, 2380. J. W. Sadler, 2395.

Ships' Boats (Lowering and Disengaging).—W. A. Brice, 2123. A E Stebbing, 2151. W. R. Lake (com.), 2162. J. Cox, 2223.

Ships (Raising Sunken or Wrecked).—H. Jubber, 2217.

Ships' Cargoes (loading and unloading).—F. Lemut, 2150.

Shirts, Collars, Wristbands, Neckties, Scarfs, Drawers, &c.—Edith A. Fox, 2114. T. W. Jones, 2127. H. A. Bonneville (com.), 2222. F. W. Kuschmann and L. Hirschfield, 2285. C. Cotton, 2300. H. S. Aumonier, 2340.

Sifting, Sorting, Separating.—J. and T. P. Hogg and R. E. Donovan, 2075.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—C. Brett, 2062. E. Burstow, 2298.

Skates, Skating-rinks.—H. Hortsman, 2064. R. Ward, 2297.

Smoke (Preventing, Burning, and Condensing).—W. Naylor, 2366.

Sounding, Ascertaining Depth of Water and Direction and Speed of Currents.—C. E. Kelway, 2292.

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Spinning and Preparing for Spinning.—H. Aydon, 2042. W. Stevenson, 2068. E. T. Sykes, 2074. A. Higgins, 2179. J. Sowden and H. Pike, 2185. R. and T. Speight, 2328. W. K. Morrison, 2355. J. Storer, 2367. R. Varley, J. P. Wolfenden, and S. Scaife, 2393.

Stamps and Stamping, Seals, Monograms, Labels, and Tickets; Damping, Cancelling, and Protecting Stamps and Labels.—W. R. Lake (com.), 2001. W. R. Lake (com.), 2030. T. Kromer (com.), 2389.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water-feeding Apparatus for Boilers. — G. Sinclair, 2004. A. N. Porteous and G. C. Bruce, 2006. E. G. Rivers, 2073. B. Harlow, 2087. H. Hirsch, 2115. T. Messenger, 2168. S. T. Shuttleworth, 2265. W. R. Lake (com.), 2332.

Steam Engines (Stationary, Locomotive, and Marine).—A. N. Porteous and G. C. Bruce, 2006. W. Rowan, 2013. R. Edwards, 2039. W. H. and A. J. Jacobs, 2044. A. Lafargue and C. Martin, 2045. J. Humphreys, 2061. P. and H. P. Gibbons and H. A. Hulsenberg, 2158. L. Tomlinson, 2164. M. Benson (com.), 2186. H. J. Haddan (com.), 2303. J. Wright, 2342. Honble. C. A. Parsons, 2344. J. A. H. Hasbrouck (com.), 2387.

Steering or Guiding Ships, Carriages, Ploughs, &c.—A. Lafargue and C. Martin, 2045. W. R. Lake (com.), 2140. H. J. Haddan (com.), 2200. L. Thomas, 2293. J. J. Kunstadter, 2294. J. W. Sadler, 2395.

Stone and Slate, Artificial Stone and Marble, Grindstones and Millstones.—T. Madderson and B. Wilkinson, 2096.

Straps, Driving Bands, and Belting for Machinery.—L. Binns, 2159.

Stuffing Boxes.—E. Turner, 2207. W. Terrell and E. Turner, 2397.

Sugar and Syrups; Glucose.—C. H. Gill (com.), 2090. S. Pitt (com.), 2251.

Surgery, Surgical Instruments, Splints and Bandages, Trusses for Hernia, Artificial Limbs.—F. J. Cheesbrough (com.), 2011. C. Cotton, 2300.

Swimming, Imparting Buoyancy.—W. Yeldham, 2014.

Telegraphs; Telegraph Printing Apparatus.—C. F. Varley, 2240.

Tents, Marquees, and Awnings.—J. G. Garrard, 2203.

Thermometers, Barometers, Pyrometers, Salimometers Electrometers; Testing Strength of Fluids.—J. M. Granville, 2182.

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Tools.—J. Roberts, 2025. J. H. Johnson (com.), 2172. J. N. Floyd and C. G. Marston, 2195. E. Yates, 2202.

Torpedoes.—C. Sholl, 2005.

Toys.—W. E. Gedge (com.), 1989. A. B. Frost (com.), 1368.

Tramways and Tramway Carriages, Tramway Locomotives.—W. E. Gedge (com.), 1988. A. N. Porteous and G. C. Bruce, 2006. A. H. Seligmann, 2129. G. Levick, 2174. G. Stevenson, 2333.

Trays, Waiters, Salvers.—W. H. Williams, 2379.

Umbrellas, Parasols, &c.—W. E. Duckett, 2155. B. J. B. Mills (com.), 2385.

Upholstery, &c.—J. R. Carruthers, 2052, J. Ganter, 2212.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of fluids.—J. J. Day, 2024. J. Gordon, 2055. H. Mantey, 2057. A. M. Clark (com.), 2095. W. M. Smeaton, 2125. J. Pope, 2132. J. Parkes, 2135. G. C. Goold, 2144. F. Delvri, 2147. T. Messenger, 2168. M. Benson (com.), 2186. A. M. Clark (com.), 2226. J. and W. Bagshaw, 2231. W. R. Lake (com.), 2291. H. J. Haddan (com.), 2303. J. C. Leaver, 2381.

Velocipedes.—H. Horstmann, 2064. J. T. Townsend, 2365.

Ventilation; Supplying and Purifying Air for Buidings, Mines, Ships, Carriages, &c.—W. Scott, 2066. H. Levinge, 2100. W. C. Buchan, 2102. W. H. Thwaites and A. Stewart (com.), 2103. W. and B. Verity, 2214. W. Greenhill, 2218. H. Carter and C. Warren, 2289. J. Feaver, 2357. T. Waller, 2378.

Vessels (nct defined). — H. Ridley, 2189. W. R. Lake (com.), 2252.

Vices, Floor Dogs, or Cramps, Cramp Keys, Wrenches, Spanners, and Screw Keys.—J. H. Johnson (com.), 2172. A. C. Alliott, 2308.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—B. C. Revett and C. T. Powers, 2035. W. Skeel (com.), 2104. E. N. Kenworthy, 2156. W. R. Lake (com.), 2268.

Water Closets, Earth Closets, Urinals, and Commodes.—J. Shanks, 2056. B. J. B. Mills (com.), 2077. A. M. Clark (com), 2095. W. M. Smeaton, 2125. J. Pope, 2132. E. Pitrat, 2141. J. Preston, 2359. T. Waller, 2378.

Wearing Apparel for Gentlemen, Military Outfits, &c.—Edith A. Fox, 2114. F. B. Halford, 2178.

Weaving, Braiding, Plaiting, Preparing for Weaving.—A. Burne, 1987. G. A. Thompson, 2027. J. Pickering, 2084. W. N. Liddell, 2092. J. Knowles, 2108. L. Fish, 2148. J. H. Buckley and R. F. Barber, 2163. W. Lord and G. Jackson, 2221. J. Holding and J. Crossley, 2224. E. Smith, 2232. H. B. Barlow (com.), 2255. S. Shaw, 2279. J. White, 2315. J. Cowburn, 2318. J. C. Mewburn (com.), 2323.

Weighing Machines, Scales, Indicating Weight.—E. H. Tooley, 2205. J. Hines, 2248. H. E. Newton (com.), 2274.

Wheels for Machinery, Cog-wheels, Cams, &c.—J. Smith and J. Course, 1993.

Winding, Reeling, and Balling Yarn and Thread.—D. Barber, 2188.

Window Blinds, Sun Blinds, Fire-screens.—C. de Quillfeldt, 2046. H. Sankey, 2273.

Windows and Sashes, Window Frames and Shutters, Window Fastenings.—J. de C. Wetherell, 2113. N. Thompson, 2215. J. Baker, 2335. G. A. Biddell, 2383.

Wire Making, Wire Ropes, Telegraph Cables, —C. Brett, 2062. E. Burstow, 2298.

Wood and Veneers, Artificial Wood.—S. J. J. Kelly, 2043. W. H. Williams, 2379.

THE HARP.

To Ianthe.

How sweet to listen to the harp
 Which steals upon the ear,
Like dreams of love, that linger still,
 As if the voice were near.
As tokens of the cherished past,
 Or still more sacred vow!
Or words from lips too dear to last—
 Methinks I hear them now!

E'en as the ling'ring light of eve
 O'er skies ere twilight's close,
As sweetest scents in secret leave
 In death the fading rose:
Cling to us long, like some fond name
 Which lights the placid brow,—
The harp that once awoke—the same
 Still breathes the chords e'en now!

Oh, thou'st a lyre, a lyre in song!
 More dear than harps to me:
Thy polished verse, remembered long,
 Will move in dreams with thee!
Long as the life that lives through time,
 And pure as streamlets glide,
When borne to some sublimer clime,
 Thy lyre will wake beside!

Henry George Hellon.

THE SPEAKING TELEPHONE IN NEW YORK.

Professor A. Graham Bell has recently completed a series of three lectures, in which he introduced his speaking telephone to New York audiences. There can be no question but that the instrument is a most wonderful invention. Without the aid of any battery, using only the current induced in the circuit by its permanent magnet, the telephone on the occasion of the last lecture transmitted musical sounds and speech from Yonkers to New York, a distance of twenty-six miles. With the battery attached, melodies and chords played on a small organ at Yonkers were distinguishable throughout the large hall where the lecture took place. It is a most bewildering sensation to hear a song faintly emitted first from a box on the stage, then from another suspended overhead, and finally from a third across the room, as the operator switches the current from one telephone to another.

Professor Bell prefaced the exhibition of his instrument with a brief account of the principles on which it is based, and gave an interesting statement of the investigations leading to its invention.—*Scientific American.*

Marine Engineering News.—We are much pleased to find that this journal (the organ of the Society of Marine Engineers, an association of a very laudable and useful character, of which Mr. M. A. Soul is the secretary) well keeps up its character as a reliable chronicler of matters connected with marine engineering.

Reviews.

ROBINSON AND MELLISS ON SEWAGE.

"Purification of Water-Carried Sewage. Data for the guidance of Corporations, Local Boards of Health, and Sanitary Authorities." By Henry Robinson, Member of the Institution of Civil Engineers, and John Charles Melliss, Associate of the Institution of Civil Engineers. London: Smith, Elder, and Co. 1877.

Here is a valuable practical work, which affords information on this important question brought up to the present time.

We quite agree with the authors of this work that, although sanitary authorities are more or less acquainted with the various systems employed for the treatment of water-carried sewage, they are generally perplexed when they have to apply their knowledge to the place under their immediate care, and frequently find that it is proposed to employ a system, unsuitable to the special circumstances of the case, on the ground that the same plan has succeeded at another place were the surrounding conditions were peculiarly favourable to it, but which are wanting in the locality under consideration. Such a course has led to an increase of the rates, which might have been avoided if some of the simplest rules which govern the case had not been disregarded. This arises less through pure ignorance than through the advocates of a particular system having gained sufficient influence to carry out their hobby irrespective of such rules.

The present would seem to be a suitable time to take stock of, and to record impartially, what has been done in regard to the treatment of water-carried sewage, and to reduce to a practical and useful form the mass of information and experience that is now available.

The importance of this subject is now well recognised throughout the country, both in its sanitary and financial aspects; and although it is surrounded with difficulties, these have been produced to a great extent by the pertinacity with which the broad scientific principles which apply to sewage treatment have been, and are still, disregarded.

In 1874 the Corporation of Rochdale collected, and published in a tabular form, what had been, and what was being, done by other towns. During the session of 1875 a return of a similar kind was called for in the House of Lords by Lord Rosebery, and it was published in March of the following year.

Almost simultaneously with this action on the part of Lord Rosebery, the Society of Arts held a Conference on the Health and Sewage of Towns, in May, 1876, the results of which, embracing much useful informa- have been embodied and published in the form of a pamphlet.

The report of a committee appointed in June, 1875, by the Local Government Board to inquire into the several modes of treating town sewage, has recently appeared, and a considerable amount of information has been collected by this committee.

Valuable as is the matter brought together in these publications, it is not in a form which can be utilized by sanitary authorities.

The object of the present work is to review and to arrange concisely the results thus obtained, and, aided by the authors' own experience on the subject, to draw conclusions for the guidance of those who have to deal with the purification of water-carried sewage.

The work is divided into parts:—

1. General conclusions.
2. Precipitation.
3. Irrigation.
4. Filtration.
5. Discharge into the Sea.
6. Appendix,

And we can affirm that under these several heads detailed information on the various points named is given in a very lucid manner.

CAPTAIN KING ON WINDOW OBSERVATORIES.

"The Window Observatory, or Directions for Rendering Practical Astronomy more Generally Useful." By H. King, Captain R.N. (Retired). London: Crosby, Lockwood & Co. 1877.

This work will be found serviceable to amateur astronomers. The origin of it the writer states, was, that he happened to be the possessor of an old theodolite. The elevation not exceeding thirty degrees, it was not adapted for astronomical purposes until he mounted it upon a block of wood which was cut to the elevation of the equator, and placed upon three marbles for a steady base. A cast of Portland cement was afterwards substituted for the wood. The result was a very fair equatorial or transit instrument, as required, and the instruction and amusement which he derived from it were so great, that he was induced to write an account of what might be done from an ordinary window with comparatively inexpensive instruments. The work might, no doubt, be extended to any length; but he has preferred to reduce it to the smallest compass, in the hope that some one may be thereby led to enjoy the practical application of the grandest of the sciences, who would otherwise have supposed it to be beyond their means. It is probable, however, that many who enter upon the pursuit will soon, like him, be tempted to provide themselves with better instruments; indeed, he is inclined to believe that, were the simplicity of the transit, and of the calculations required for its use, more generally known, few gentlemen's houses would be without one.

The work gives information in a succinct way as to astronomical instruments, methods of observation, Greenwich mean time by the sun and by star's transit, the meridian, astronomical formula, and winds up with a star table. Anyone who wishes to enjoy the pleasure afforded by practising astronomical observation, though compelled to do so on a small scale, should get this little book.

DARWIN ON CROSS AND SELF-FERTILIZATION.

"The Effects of Cross and Self-Fertilization in the Vegetable Kingdom." By Charles Darwin, M.A., F.R.S., &c. London: John Murray, Albemarle Street, 1876.

This work is, the author informs us, a complement to that on Orchids, which we reviewed sometime ago.

The present work opens with an introductory chapter, which gives the reasons and the method adopted in the various experiments, and we cannot do better than quote the words of the author:—

From my own observations on plants, guided to a certain extent by the experience of the breeders of animals, I became convinced many years ago that it is a general law of nature that flowers are adapted to be crossed, at least occasionally, by pollen from a distinct plant.

I was at last led to make the experiments recorded in the present volume from the following circumstance. For the sake of determining certain points with respect to inheritance, and without any thought of the effects of close interbreeding, I raised close together two large beds of self-fertilised and crossed seedlings from the same plant of *Linaria vulgaris*. To my surprise, the crossed plants when fully grown were plainly taller and more vigorous than the self-fertilised ones. Bees incessantly visit the flowers of this Linaria and carry pollen from one to the other; and if insects are excluded, the flowers produce extremely few seeds; so that the wild plants from which my seedlings were raised must have been intercrossed during all previous generations. It seemed therefore quite incredible that the difference between the two beds of seedlings could have been due to a single act of self-fertilisation; and I attributed the result to the self-fertilised seeds not having been well ripened, improbable as it was that all should have been in this state. Or to some other accidental and inexplicable cause. During the next year, I raised for the same purpose as before two large beds close together of self-fertilised and crossed seedlings from the carnation, *Dianthus caryophyllus*. This plant, like the Linaria, is almost sterile if insects are excluded; and we may draw the same inference as before, namely, that the parent-plants must have been intercrossed during every or almost every previous generation. Nevertheless, the self-fertilised seedlings were plainly inferior in height and vigour to the crossed.

Other plants were also taken for experiment with a similar result. The method adopted of carrying on the experiments is then described, and the results of a long series of experiments to determine the effect of Cross and Self-Fertilization of various plants are given in the other chapters. We cordially recommend the work to those who take an interest in the subject.

HENCHIE'S TRIGONOMETRY.

"Manual of Plane Trigonometry." By James Henchie. London: Thomas Murby, 32, Bouverie Street, Fleet Street, E.C.

We should have imagined that it was time authors had ceased giving us text books (so-called) for helping students to pass in this or that subject named in the lists of the Science and Art Department. The Department has certainly done much to promote science during the last few years, but it also has indirectly promoted a number of works and series of works, some few of which are good, but the rest of a kind that had better not have been published. These latter are, as a rule, cram books, taking as their bases the questions (which generally are catchy) put at the examinations held by the Department and answering them.

The work under notice the author informs us is chiefly for helping the students to obtain a first-class pass in stages II., III. of mathematics. Now we think that a work which embraces the whole of the stages of the examination in plane trigonometry (such as Todhunter's and others) is far better than taking only a portion of the subject. However, to those students who may desire to have only a part, this work will be of use.

ELTOFT'S NOTE BOOK AND NOTES FOR CHEMICAL STUDENTS.

"The Combined Note Book and Lecture Notes for the use of Chemical Students." By Thomas Eltoft, F.C.S. London: Simpkins, Marshall, and Co., 4, Stationers' Hall Court. 1876.

This work will, we think, be found to serve the purpose the author has in view.

The first 20 pages of the book are devoted particularly to nomenclature atomicity of the elements and graphic formulæ, which will be found useful to the student. Then we find 80 pages, which form the novel feature of the work. This consists of arranging the pages of each set of experiments systematically, so that the student can rapidly arrange and take down notes whilst attention is paid to the lecture.

The concluding portion of the book contains the best known methods for the preparation of the various elementary and compound bodies.

The work will, we have no doubt, be found very useful to chemical students. It does not take the place of any text book, but forms an adjunct thereto.

THE COLONY OF VICTORIA.

"Notes on the Colony of Victoria." By Henry Evelyn Hayter. McCarron, and Co., Melbourne; Trübner and Co., Ludgate Hill.

This work is deserving of mention as being superior to the ordinary books issued by Colonial Governments at the Antipodes. The feature which we may mostly dwell upon is the excellent large map, the folded tables, and the number and variety of the tabular statements. It commences with the early history and discovery of the colony. The matter, however, which will be of the greatest interest to our readers is the list of manufacturing industries of the colony in metals. They are as follows:—Antimony smelting works, bell foundries, die-sinking, medals, button manufactories, electro-plate, fireproof safe, goldsmiths and jewellers, iron and tin works, iron, brass, and copper foundries, lead works, metal refineries, tin smelting works, type foundries, and wire working establishments.

"Trade Marks" is the name of a new journal devoted to all matters connected with British, colonial, and foreign trade marks, and for the promotion in every country of the legislation and treaty stipulations necessary to establish a complete system of international registration. It is to be edited by Edmund Johnson, who is well known as one of the great promoters of the system of registration of trade marks. On July 1st the Trade Marks Registration Acts will come into full activity, except so far as concerns textile fabrics, the dealing with which under the Acts it is proposed to defer by a Bill introduced this session. The property in trade marks thus acquires much greater security, the value of existing marks is enhanced, and a powerful inducement presented for the adoption of trade marks in industries to which they have not hitherto been applied. The change affects every important branch of commerce, and vast interests in each: but the system is yet in its infancy, and in its development much is uncertain. To watch decisions on moot points, the extension of trade marks registration to new branches of mercantile activity, and to other countries, will be the duty of every manufacturer of trade-marked goods, and of all who are largely concerned in the distribution or consumption of the manufactures. To publish full explanations of doubtful points, and readable digests of official documents, to hit the blots in the existing system, and show how its usefulness may receive a wider extension, is to be the business of *Trade Marks*; and the due fulfilment of this programme should entitle it to a very wide share of support. Concurrently with the issue of the first number, on July 2nd, an exhibition of trade marks will be opened at the publishing office, 3, Castle-street, Holborn, London.

ROYAL ACADEMY OF MUSIC.

On the 1st June was performed, before a distinguished company, at the "Royal Academy of Music," a sacred Cantata: "Christ's Entry into Jerusalem," by C. H. Couldery. It has been the custom of late years to devote the entire evening to a composer's work, but the musical public prefer variety, and in this they were accommodated by Mr. Couldery, who arranged a very excellent programme, which included the works of Gounod, Sullivan, and Wagner. The principal vocalists were Miss Marion Severn, Miss Jessie Jones, Mr. W. H. Cummings, and Mr. Wadmore. The Cantata opened with a choral prelude, followed by a Recit and Aria, which was sung with great effect by Mr. Cummings. But the best air, and that which was most warmly received was that to the words, "Teach me to do Thy will." This charming air was admirably sung by Miss Marion Severn, which, with a trio "Softly fall those sounds upon the ear," called for an encore. Great praise is due to Mr. Wadmore for the execution of the Recit: "And Jesus went into the Temple of God."

The Cantata is of a high standing, and gives many proofs of genius, there is a rich sweetness in the airs, which impresses us that the composer is an innate master of his art, and has a power which has yet to be called forth. There need be no greater proof of good music than the effect upon the listeners, especially such as attend the "Royal Academy of Music:" the attention of the audience and the spirit with which some of the airs were received were a great compliment to the composer. We congratulate Mr. Couldery on the choice of his conductor, Mr. Pettit; but part of the music was spoilt by a want of vitality in the choir.

At the close Mr. Couldery was called for, and warmly received by the audience. After which the "Ave Maria," of Gounod, was charmingly sung by Miss Jessie Jones.

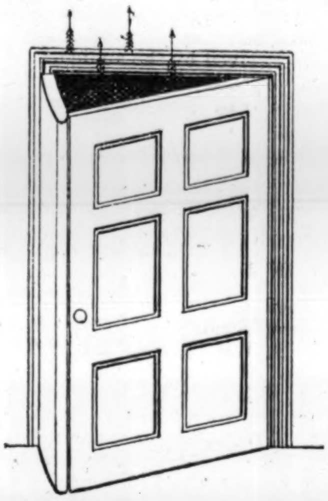
PREMIUMS AWARDED BY THE INSTITUTION OF CIVIL ENGINEERS. —SESSION 1876-77.

The Council of the Institution of Civil Engineers have awarded the following premiums:—1. A Watt Medal and a Telford Premium to William Worby Beaumont, Assoc. Inst. C.E., for his paper on "The Fracture of Railway Tires." 2. A Watt Medal, and a Telford Premium, to William Cawthorne Unwin, B.Sc. Assoc. Inst. C.E., for his paper on "The Resistance of Boiler Flues to Collapse." (Mr. Unwin formerly received a Telford Medal.) 3. A Telford Premium to Robinson Souttar, for his paper on "Street Tramways." 4. A Telford premium to Isaac John Mann, for his paper on "The Testing of Portland Cement. 5. A Telford Premium to William Anderson, M. Inst. C.E., for his "Experiments and Observations on the Emission of Heat by Hot-water Pipes." 6. A Telford Premium to John Baldry Redman, M. Inst. C.E., for his paper on "The River Thames." 7. A Telford Premium to Henry Robinson, M. Inst. C.E., for his paper on "The Transmission of Power to Distances." 8. A Telford Premium to Alexander McDonnell, M. Inst. C.E., for his paper on "The Repairs and Renewals of Locomotives." 9. A Telford Premium to Richard Henry Brunton, M. Inst. C.E., for his paper on "The Japan Lights." 10. The Manby Premium to Charles Norman Bazalgette, Barrister-at-law, for his paper on "The Sewage Question." The Council have likewise awarded the following prizes to Students of the Institution:—1. The Miller Scholarship to Percy Ruskin Allen, Stud. Inst. C.E., for his paper on "Machine Tools." 2. A Miller Prize to Arthur Cameron Hurtzig, Stud. Inst. C.E., for his paper on "Submarine Foundations." 3. A Miller Prize to Charles Smith, Stud. Inst. C.E. for his paper on "The South Reserve Floating Landing Stage and Piers at Birkenhead." 4. A Miller Prize to Richard John Gifford Read, Stud. Inst. C.E., for his "Comparison of the Merits of Wrought-iron Plate and Trussed Girders for Single-span Railway Bridges." 5. A Miller Prize to Nicholas Watts, Stud. Inst. C.E., for his paper on "Mechanical Puddling in the Manufacture of Iron." 6. A Miller Prize to William James Chalk, Stud. Inst. C.E., for his paper on "Waves, and on Structures designed to resist their Force." 7. A Miller Prize to John Charles Mackay, Stud. Inst. C.E., for his paper on "Engineering Explosives."

Note.—Mr. Graham Smith and Mr. Watts have been elected Associates of the Institution since the date of the presentation and reading of their papers.

FREE VENTILATION WITHOUT ANY DRAUGHT.

The object of the system patented by Mr. R. Harris, of 3, Vinery Villas, Regent's Park, is to provide a simple and inexpensive, as well as a thorough method of ventilating rooms, without any objectionable draught. Applied to doors the idea consists in providing a kind of shutter attached to the door post in such a way that when the door itself is open this mechanical addition closes the aperture at the side, leaving the top of the doorway for the admission of air. By this arrangement it will be readily seen that all the advantage of fresh air, without the unpleasantness and risk of draught can be procured. It is peculiarly fitted for the sick room where a change of atmosphere is most important.



Referring to the illustration, fig 1 represents a simple adaptation of the idea, which can readily be applied without necessitating any alteration of construction. The arrows show the direction taken by the entering current.

This theory appears to be equally good when applied to the condition of casement windows.

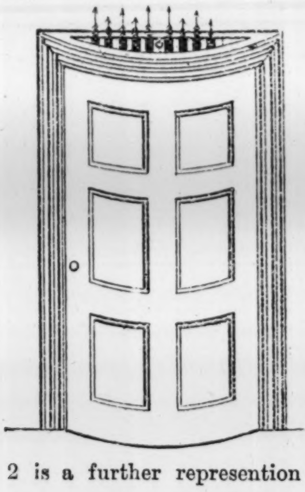


Fig. 2 is a further represention of the idea, one door being made in a crescent shape with suitable louvre boards on the top for regulating the admission of air.

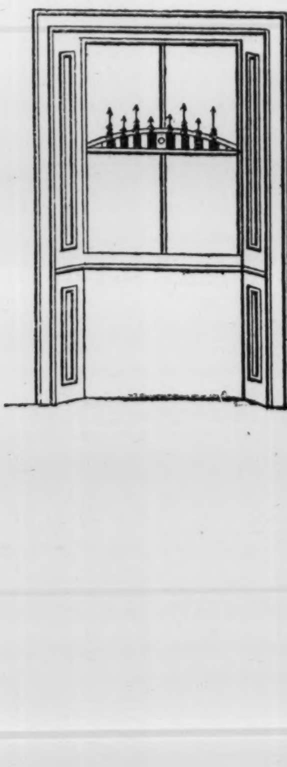


Fig. 3 shews the same adapted to windows.

It is highly necessary that school-rooms, &c., should be freely ventilated. To insure this free admission must be given, which can only be obtained by large openings. To accomplish this Mr. Harris proposes running a channel way, standing a few inches away from the wall, taking the place of the shutter in fig. 2, which will give the required area of opening. Windows are treated in like manner, with this exception, that the channel ways are run on each side, having the ends closed up, and likewise the bottom, and leaving only the top for the admission of air freely without any draught, the current being directed upwards.

NEW FORM OF BATHING HOUSE.

By J. J. Gordon, D.C.L.

At this season of the year the description of a new bathing house may be of interest to the readers of your paper. The one we refer to is designed to afford a remedy for the roughness of the coast spoiled for bathing by rocks and stones. It has comparatively recently been erected at a country town on the shores of the Moray Frith. As you enter upon the sea-side from the end of the three harbours filled with German herring vessels you have on the left the high wall of the railway station, and on the right one supporting the road which is not passable for conveyances, going down twenty feet to the water. Some fifty yards on, is situated, founded on rocks, the new bathing house, an entrance to which has been built to the level of the road. The building is neat, of one storey, temple shape, with a chimney of natural red brick fifteen feet high. There is a window on each side of the door. The pumping machinery descends the exterior to the beach, where piping extends to the water. On entering there is a room on each side—the towel and waiting room. Next there is a corridor to the right, where are four baths for hot and cold water, one of them like some of the People's London baths, also a shower bath. At the back is a square room, where some of the machinery is placed, and into which room three more baths open This room is the undressing room for the sea, a door opening on to a gangway or penwalk descending to one of some low rocks, which are covered with water at high-tide, and so entirely separated from the shore. Some more rocks stretch out to this one from the shore, affording, however, no protection from the approach of the public. This, however, can be obviated. It is clear that the advantage of this system of baths is great where there are no caravans. Excepting a space of sand not always safe, a quarter of a mile distant from the bath-house, the coast is almost all rock—high masses of which protrude like arms into the sea—also round stones and pebbles. However, just beyond the low rocks at the back of the bathing houses, there is a beautiful piece of sand—the only one for some distance, which is a great convenience for ladies; as in almost all other parts of the beach, they and all non-swimmers are obliged to wear boots and shoes. As often happens on rocky coasts, the sea is particularly good and refreshing, being beautifully clear and coming in in splendid waves, under which the bathers duck, holding on by the corners of clean rocks, many of the rocks being covered with tangles and sea-weed. This bath-house is a joint stock concern, the shares being held by old visitors, including some of the squirearchy and the bank agents, gentry, solicitors, and shopkeepers of the town—the population of which is 5,000.

FOREIGN SCIENCE.

The number of *Les Mondes* of 7th June contains an article describing the Exhibition at Compeigne, as to which we may refer to, some machinery of note. First, there is the fire-grate of Mr. Wackernie, the bars of which are moved either in an ascending or descending direction by a linked lever. This arrangement allows the fire to be poked without opening the door of the fire-place. From recent experience it would appear that a remarkable economy of caloric is thus obtained—viz., 12½ per cent. The feeding apparatus of M. Cleuet, the object of which is to maintain a constant level in the boiler, whilst the feeding pump goes continually; and the vertical machine with continuous circulation, by Rittkers, considered by some the most perfect machine of the kind, are also to be noted.

The artificial incubators of the *Jardin d'Acclimation* had a large share of success. M. Le Marechal MacMahon personally manifested his admiration by the acquisition of one of the large models of these curious apparatus, which besides obtained the great gold medal. This exhibition will be prolonged to the 31st August, so that our readers will have an opportunity of visiting it. The chief features are the industrial, agricultural, artistic, and commercial productions of Northern France. M. Fabius Boitel, of 21, Boulevard Rochechouard, the same person whom the Government charged with lighting Paris during the siege, has just founded a special "lighting" house. He, it appears, is the inventor of "the Prussian" gas-burner—so-called because he was obliged to apply for construction to Berlinese manufacturers. Besides the permanent exploitation of apparatus applied to lighting of the old kinds M. Boital is introducing to commerce some new inventions. Amongst them is an incombustible wick for oil-lamps; a butterfly burner for gas, giving, with an economy of 30 per cent., a light superior to that produced by the best known burner with an economy of 25 per cent; and a regulating burner of simple construction, allowing the gas to be burned in an equal and uniform manner.

Baron Hubner, the Austrian Plenipotentiary at the Congress of Paris, by way of recreation has, it appears, made a tour round the world. On 14th May, 1871, he left Queenstown, and returned to Europe on 13th January, 1872. After visiting and studying politically three great countries—the United States, Japan, and China—being absent only eight months. *Cosmos* on this takes occasion to compliment the nobility thus: "The authors, of recently published travels apparently belong to the nobility. They employ their leisure, their fortune, their education—the influence of their social position in informing us the better as to the state of East and West—they carry European ideas into another hemisphere, they bring back descriptions and studies, which make these countries intellectually known to those who cannot visit them." Mons. Maxime du Camp has just brought out a new work at Hachette's, Paris. This gentlemen, who has twice visited the Troy country is absolutely convinced not only of the perfect authenticity of the discoveries of M. Schliemann, but also of the exactness of the assimilation between the second bed of the superposed ruins discovered by him and Homer's Troy. The comparison of the Archæological researches by M. Schliemann result as those of M. Du Camp, and the more recent historical studies of Mr. Gladstone in enabling a writer in *Les Mondes* to prepare a chronological table as to the successive existence of various towns which occupied the ground of Troy.

Some experiments have been made to fix the diffusion of the vapours of sulphur of carbon introduced into the soil as an insectifuge. In permeable ground the diffusion of sulphur vapors has attained a maximum degree of about a metre round the hole of injection. The vapors have penetrated to a distance of 30 centimetres from the 1st to the 5th March—therefore, during about 100 hours; and nearer the hole of injection sulphur of carbon has been recognised during 100 hours. The diffusion of sulphur of carbon in clayey soil has been as extensive as in permeable soil, and the existence of vapors has been prolonged more than 24 hours.

The new company under the name of the America Cable Company is to have a line as follows. The transatlantic cable of the Azores to place the town of New York in communication with France, England, Holland, Portugal, and Italy. The cable will begin at the town of New York itself, and touch in the first place the Island of Florés, of the group of the Azores. The American Company has not limited itself to obtaining the ground-rights, which were necessary for the establishment of its cables; it has secured, by the concurrence of the most renowned manufacturers, the use of apparatus capable of transmitting 20 and 25 words a minute. We may add, that it has besides the exclusive use of two new instruments, by means of which it will be possible to transmit 40 to 50 words a minute.

THE NEW SUN AND ITS DISAPPEARANCE.

The phenomenon of the appearance of a new star in the heavens is rare enough to arouse the greatest interest among astronomers and other scientific persons. It is not merely an occurrence appalling in its mystery and immensity; but even in the minds of those accustomed to contemplate the majesty of other worlds, it tends to arouse questions of the gravest importance relative to the physical and chemical constitutions of the stars, and to the comparison of our own sun with other far distant ones.

On November 24th last, M. Schmidt, Director of the Observatory at Athens, Greece, at 5h. 41m. in the evening, saw a star of the third magnitude in the constellation *Cygnus*. No record of the existence of any such star was in existence. No such star was visible on November 20th; but whether it appeared on one of the intervening days between that date and the 24th, M. Schmidt cannot say, as cloudy weather had then prevailed in Athens. The news was at once telegraphed throughout the world, and the astronomers watched the new star gradually wane until, on December 8th, it was scarcely of the sixth magnitude.

By comparing the observations of the discoverer, M. Schmidt, with those of M. Prosper Henry, we find two important facts: First, that within eight days the star diminished from the third to the fifth magnitude; and, secondly, that the colour changed from a marked yellow to a bluish green. On December 2nd, spectroscopic observations at different observatories were made; and the general conclusion was that the spectrum, being formed in large part of brilliant lines, was that of an incandescent vapour or gas. On December 4th, M. Cornu obtained a very satisfactory observation, which enabled him to identify three lines as the lines C, F and 434 of hydrogen. A fourth appeared to him to correspond to the line, D, of sodium, and another with the characteristic line, *b*, of magnesium. Finally, two lines, of which the wave lengths are 531 and 451, appeared to coincide, one with the famous line 1474 (Kirchoff's scale), observed in the solar corona during eclipses; the other with a line of the chromosphere.

It thus appears that the light of this new star is exactly the same in composition as that of the solar chromosphere; and thus we are told that the new comer is a sun, doubtless in general respects like our own, which has met with some great catastrophe whose cause we cannot at present determine, but whose real nature is unmistakable.

"Our sun," say Prof. Proctor, commenting on the phenomenon, "is one among hundreds of millions, each of which is probably, like it, the centre of a scheme of circling worlds. Each sun is rushing along through space, with its train of worlds, each bearing perhaps, like our earth, its living freight, or more probably each, at some time or other of its existence, becoming habitable for a longer or shorter period. Thus the suns may be compared to engines, each drawing along all its well-freighted train. Accidents among these celestial engines seem fortunately to be rare. A few among the suns appear suddenly (that is in the course of a few hundred years, which in celestial chronometry amounts to a mere instant) to have lost a large part of their energy, as though the supply or fuel had somehow run short. Mishaps of that kind have not attracted much attention, though manifestly it would be a serious matter if our own sun were suddenly to loose three-fourths of his heat, as has happened with the middle star of the Plow, or ninety-nine hundredths, as has happened with the once blazing, but now scarcely visible, orb called *Eta* in the keel of the star-ship *Argo*. But when we hear of an accident of the contrary kind—a sun suddenly blazing out with more than a hundred times its usual splendour—a celestial engines whose energies have been over-wrought, so that a sudden explosion has taken place, and the fires, meant to work steadily for the train, have blazed forth to its destruction—we are impressed with the thought that this may possibly happen with our own sun. The circumstances are very curious, and though they do not show clearly whether we are or are not exposed to the same danger which has overtaken the worlds circling around those remote suns, they are sufficiently suggestive.

"Now, a point to which I would call special attention, is that all the elements of the catastrophe, if one may so speak, which has befallen the remote sun in the Swan exists in our own sun. At times of marked disturbance parts of our sun's surface show the lines of hydrogen bright instead of dark, which means that the flames of hydrogen over those parts of the sun are hotter than the glowing surface of the sun there. We have all heard, again, how Tacchini and Secchi, in Italy, attributed some exceptionally hot weather we had a few years ago to outburst of glowing magnesium. And, lastly, our sun is well supplied with that element, whatever it is, which gives the bright line of its corona duing eclipses; for we now know that the whole of the streaked and radiated corona occupying a region twenty times greater than the globe of the sun (which itself exceeds our earth one million two hundred and fifty thousand times in volume) belongs to the sun. Again, though the sun has shone steadily for thousands of years, yet, so far as can be judged, the stars which, like this one in the Swan, have burst out suddenly, blossoming into flames of hydrogen, within which the star's heart core glows with many hundred times its former heat, have also been for ages shining steadily amid the star depths. We know that the one which blazed out ten years ago in the Northen Crown was one of Argelander's list, a star of the tenth magnitude, and that, after glowing with eight hundred times its former brightness for a few days, it has resumed that feebler lustre. We have every reason which analogy can furnish for believing that the new star, which was not in Argelander's list, simply escaped record by him on account of its faintness. It is now fast losing its suddenly acquired lustre, and is already invisible to the naked eye. It appears, therefore, that there is nothing in the long-continued steadfastness of our sun as a source of light to assure us that he, too, may not suddenly blaze forth with many hundred times his usual lustre (the conflagration being originated, perchance, by some comet unfortunately travelling too directly towards him). Though he would probably cool down again to his present condition in the course of a few weeks, no terrestrial observers would be alive at any rate to note the fact, though the whole series of events might afford subject of interesting speculation to the inhabitants of worlds circling round Sirius or Arcturus. Fortunately we may legitimately reason that the risk is small, seeing that among the millions of suns which surround ours, within easy telescope distance, such catastrophes occur only ten or twelve times per century."

In addition to the chances in our favour that our sun will not be the next one to blaze forth like that above described, Professor Loomis, of Yale College, explains that such variations in the brightness of stars are not very unusual nor very infrequent, and that while the cause of these phenomena, yet a matter of conjecture among astronomers, is probably the falling of some aerial wanderer, like a comet or a meteor, into the fixed star and its consequent rapid combustion, such an event need produce no serious results necessarily, since it is a commonly received theory that the continuous intense heat of the sun is caused by the constant accession of such combustible and inflammable bobies. —*The Western Review*, Kansas, U.S.

GERMAN *v.* SHEFFIELD SCISSORS.

"At the annual meeting of the Sheffield Scissors Manufacturers' Association, held during the past month, an animated discussion took place on the remarkable success with which the German scissors makers are competing with those of Sheffield. Mr. Hobson, the chairman, said that a warehouse had been opened in Sheffield for the express purpose of stocking and selling German scissors, and various other speakers were constrained to admit that the foreign articles were by no means badly made. As a matter of strict and most surprising fact, these German scissors are made at Solingen from Sheffield steel, and, after bearing freights in both directions, thus oust us at home. When the German scissors come here they are offered at prices 30 to 40 per cent. below the home-made goods—weavers' scissors sold by the Sheffield manufacturers at 72 cents, gold, being quoted by the importers at 54 cents free in London, or 72 cents in Sheffield. The consequence is that the Germans are doing a very large business in the steel metropolis, because almost all the manufacturers find it necessary to keep the foreign goods in stock."—*British Trade Journal.*

PATENTS AT AUCTION.

A novel mode of disposing of patents is announced in the advertising columns of the *Scientific American*. Mr. George W. Keeler, an auctioneer of experience, proposes to receive letters patents on consignment, which he will offer at public auction at stated intervals, in the same way as coal is disposed of monthly in the city, of New York. Mr. F. W. Campin, (Sec. Inventors' Institute), says he suggested the adoption of this system in England many years ago.

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President, SIR ANTONIO BRADY.

The Session 1876-77 is now ended. Notices of Executive Council Meetings will be given by post.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts. F. W. CAMPIN, Sec.

N.B.—The movement for the REDUCTION OF PATENT STAMP DUTIES *is still on foot; those who wish to support it should at once communicate with the Secretary.*

Proceedings of the Institute.

EXECUTIVE COUNCIL.

ON 14th June the Executive Council held its last meeting for the Session 1876-77, being the *first* Executive Council since the last Annual General Meeting. It was attended by Messrs. S. Calley, T. Blanchett, F. H. Varley, T. Morgan, M. Zingler, and F. W. Campin (the Secretary). Mr. Blanchett, being a new member, (elected at the Annual General Meeting in place of Mr. Sweet) was introduced by the Secretary. Mr. F. H. Varley was reelected as Chairman of the Executive Council, to act in the absence of the President or a Vice-President of the Institute; he accordingly took the chair. The minutes of the last meeting were read and confirmed. Finance questions were then considered, and it was unanimously resolved that Mr. G. A. Stretton (the present Receiver and Book-keeper, who has filled the first named office for many years past) should until further orders as to the Treasurership, be authorised as the acting treasurer. Directions were given as to the balance due from the late Treasurer. Some cheques were signed by the Chairman in accordance with the rules, and a resolution was passed as to the desirability of the Secretary applying to the Attorney-General and to Mr. Mundella, M.P., in regard to the position of the New Patent Bill if opportunity should occur. A vote of thanks to the Chairman concluded the meeting.

MEMBERS' MEETING.

The last Members' Meeting of the Session was held on the 14th June, F. H. Varley, Esq., C.E., F.R.A.S., in the chair. The paper read was by G. E. Pritchett, Esq., "On Indicating Correct Time by Concurrent Action from one Standard Clock." This meeting was well attended; Messrs. Connel Webster, De Solla, and other gentlemen practically acquainted with the subject being present and taking part in the discussion; the reading of the paper created considerable interest; but as it is understood that the subject is to receive further consideration by the Institute we reserve our report for future publication.

Monthly Notices.

The Italian Society of Sciences, or "the Society of Forty," has awarded to Sir William Thomson, of Glasgow, the Matteucci Prize, for the investigator who has contributed most to the advancement of science during the past year.

Dr. Hooker has been made a Knight Commander of the Star of India.

The Weather.—Mons. M. S. Renou, director of the Meteorological Observatory of Parc Saint Maur near Paris, has published the statement that there were severe innundations in Ain during the last days of May, owing to stormy rains and a frightful tempest at Brest on the 1st of June. A more interesting piece of information is afforded by the same scientist, that for the last century there have been only three months of May colder than that of 1877—viz., 1837, 1845, 1851.

The Annual Meeting of the British Association will commence on Wednesday, August 15th, at Plymouth. The President is to be Prof. Allen Thomson. The Vice-Presidents, the Earl of Mount-Edgcumbe, Lord Blachford, Mr. Spottiswoode, Mr. W. Froude, and Mr. C. Spence Bate. The Local Secretaries are Messrs. W. Adams, W. Square, and H. Whiteford. On Thursday evening, August 16th, there will be a Soirée; on Friday evening, the 17th, a discourse by Prof. Warington Smyth, "On the Physical Phenomena connected with the Mines of Cornwall and Devon." The Presidents of Sections are as follows:—Mathematical and Physical Science, Prof. G. C. Foster; Chemical Science, Dr. Abel; Geology, Mr. W. Pengelly; Biology—Department of Zoology and Botany, Mr. J. Gwyn Jeffreys, President of the whole Section, will preside; Department of Anthropology, Sir Walter Elliot; Geography, Admiral Ommanney; Economic Science and Statistics, the Earl of Fortescue; Mechanical Science, Mr. Edward Woods, C.E.

The death of Mr. John J. Griffin, F.C.S., at the age of seventy-five, is announced. Mr. Griffin was long connected with the scientific world, and of late years more especially has he been associated with our chemists, as the inventor and constructor of many ingenious pieces of chemical and physical apparatus. Mr. J. J. Griffin was born in London in 1802. He was the author of "The Radical Theory of Chemistry," a "System of Crystallography," of "Chemical Recreations," a "Treatise on the Blowpipe," and other works. He was also the editor of the "Encyclopædia Metropolitana."

Captain R. Beavan, of the Bengal Staff Corps, having devoted his leisure hours to the study of the freshwater fishes of India, is about to give the results of his researches to the public in the shape of a handbook describing the characteristic peculiarities of all the species at present known, and intended as a guide to students and district officers. Messrs. L. Reeve and Co. will be the publishers.

The death of General Sir Henry James, at the age of seventy-four, is anounced. In 1854 he was appointed to conduct the Ordnance Trigonometrical Survey of Great Britain, and in 1860 he received the honour of knighthood. Sir Henry was the author of "Notes on the Pyramids," "On the Tin Trade of the Phœnicians," and other works of scientific interest.

Jablochkoff's "Electric Candle" was tried at the West India Docks on Friday evening, June 15th. A magneto-electric engine supplied the electricity, and it was satisfactorily proved that a steady and brilliant light is secured by the arrangement which M. Jablochkoff has introduced.

The gold medal of the St. Etienne Mining Association has been awarded to M. F. Laur, editor of *Echo des Mines*, for his essay on the treatment of coal-mines, with especial reference to the applications of science to ventilation, lights, &c.

The Inventors' Patent-right Association, Limited, recently held its Annual General Meeting, when a final dividend was declared for the year, which brought the total amount of annual dividends up to a considerable figure. The business done was stated to have been in excess of last year. Considering the fact that this Association transacts all its business at fixed and moderate charges under the advice of a competent Patent Law Counsel, Mr. F. W. Campin, the author of the "Law of Patents for Inventions" (Weale's Series), and has for its Secretary Mr. T. Morgan, A.S.E., who has had long experience in patent matters, its successful progress is not to be wondered at.

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JULY 1, 1877.

CONSTRUCTION OF OUR WAR SHIPS.

Although happily this country is at present in a state of peace, yet the warfare now going on between Russia and Turkey has for the British nation such an amount of direct interest, and creates so much apprehension as to the position which the United Kingdom may find itself bound in defence of its vital interests, under certain circumstances, to assume, that anything connected with the scientific and practical questions involved in our naval constructions must be of considerable interest; hence the controversy recently carried on in the public journals on the subject of the *Inflexible* and ships of that kind of construction is worthy of earnest attention.

According to the *Times*, the controversy about the *Inflexible* is so simple that it required some ingenuity in the debate which took place very recently in the House of Commons to make it obscure; and the same journal adds: "The *Inflexible* is a ship of a new type, intended to be of the greatest service in war. Can she be trusted to do her work in case of war? If she can, we are making a most valuable addition to our fleet; if she cannot, we have made a great error and must take care not to repeat it. As the *Ajax* and *Agamemnon*, not to mention a third unnamed ship, are intended to be constructed on her model, the question at issue is of practical and pressing interest. It has been argued that the stability of the *Inflexible* could not be depended upon under the ordinary contingencies of a naval action. In the debate in the House of Commons Mr. Seely as an Admiralty critic challenged Mr. Reed to declare his opinion on the point, who expressed himself as rather desirous to avoid the responsibility of such a declaration, but he gave it in an unequivocal fashion. He said he believed the *Inflexible* might go to sea with perfect safety for any length of time provided she did not enter on a naval engagement—an opinion which naturally provoked much laughter; but he added that if she did enter on a naval engagement, and was attacked by shell fire and her ends destroyed, she would be left without stability and would then capsize. The question at once arises whether this destruction of the ends of the *Inflexible* is a contingency to be regarded as a probable incident of an engagement, or whether reference to it means anything more than the truism about an ordinary ship, that if there is a hole made in her bottom she will go down. An explanation of the frame of the *Inflexible* shows that her ends are unprotected, and their destruction contemplated by her designer as a natural incident of war; but he insists that her stability would be unimpaired by their destruction. The *Inflexible* is, in fact, a square citadel or battery mounted on a thick iron deck some six or seven feet below the water-line. Upon this deck and about this citadel the visible ship is constructed, and is unarmoured. It must be expected that if she went into action her ends would be riddled with shell, but it was contended at the time she was projected that this was immaterial. The calculation was that even if the unarmoured ends was destroyed—not, that is to say, if they were absolutely shorn away, but if they were so riddled through and through that the water would flow in and over the iron deck from stem to stern—the sole effect would be that the submersion of the iron deck would be increased a foot or thereabouts, and the stability of the ship would be uninjured. Mr. Barnaby, in a communication to the *Times*, insisted that the range of stability would remain 48 degrees, whereas the Committee on Naval Designs held that a range of 40 degrees was sufficient. Mr. Reed, in a rejoinder to Mr. Barnaby, not admitting that the range claimed would be secured, derides the criterion of safety thus suggested. It seems to be admitted that some further safeguards of stability have been projected since the adoption of the original design, but the present chief constructor lays no stress upon them. The Admiralty are putting a second thin iron side a few feet within the original side, and it is proposed that the intermediate space shall be divided into compartments, some of which are to be filled with cork. But what would be the security thus derived in the case of war? Mr. Barnaby lays no stress on it, and Mr. Reed treats it as wholly untrustworthy." According to the *Times*, it is obvious that the merit or demerit of the design of the *Inflexible* must be tested without these additional safeguards; and this, adds that journal, is the issue which the conversation in the House of Commons did not and could not settle.

It would seem that the question of the stability of the citadel of the *Inflexible* if deprived of the assistance, without being relieved of the weight, of the unarmoured ends ought to be capable of precise settlement. Mr. Reed states that an approximate *Inflexible* was designed in his office and put to the test, and it was found that "the citadel alone would not keep the ship upright, or prevent her from capsizing and going to the bottom." The conclusive character of this experiment will of course be denied on the other side. The real difficulty, indeed, is to discover the authority that shall determine the truth between the disputants. Sir Spencer Robinson says that the whole episode points to the necessity of acting upon a recommendation he has before suggested—that an examining council should be appointed as a referee to be consulted by the Admiralty and to defend the Board from their own designers and constructors. It is possible that this may be ultimately recognised as the right thing to be done, but the *Times* considers that there must be a preliminary investigation before a Royal Commission or a Committee of the House of Commons; and it would seem that the latter is the better tribunal. It is an easily accessible tribunal, and would be able to settle without much difficulty and with great quietness some of the points in the controversy. For ourselves we are not indisposed to join issue with Mr. Reed by siding with Mr. Barnaby, as we cannot see that the unarmoured ends, even when pierced with holes, would simply by the fact of such piercing *per se* prove fatal to the stability of the so-called iron citadel, for it seems to us that if such unarmoured ends are suitably constructed they would in any event act, so to speak, as a kind of outriggers, and assist in providing for the stability of the vessel.

The whole question is one for the application of some kind of practical test, as to which Sir W. Palliser has suggested the construction of a large scale model. By common consent the question cannot be left where it is, and we agree with the *Times* that, without excluding other modes of settling it, a Parliamentary Committee may be recommended as the best means of making a preliminary, if not a final, investigation.

Proceedings of Societies.

ROYAL SOCIETY.

May 31st.—Dr. Hooker, President, in the chair.—The following papers were read:—"On the Physical Properties of Homologues and Isomers," by Mr. F. D. Brown,—"On the Amplitude of Sound Waves," by Lord Rayleigh,—and "On the Alleged Correspondence of the Rainfall at the Madras with the Sun-spot Period, and on the True Criterion of Periodicity in a series of Variable Quantities," by General Strachey.

June 7th.—Sir J. Hooker, in the chair.—The Annual Meeting for election of Fellows was held, and the following were elected:—Prof. J. Dewar, Sir J. Fayrer, M.D., Rev. N. M. Ferrers, T. R. Fraser, M.D., B. H. Hodgson, J. W. Judd, W. C. M'Intosh, M.D., R. M'Lachlan, Prof. J. W. Mallet, H. B. Medlicott, H. N. Moseley, Prof. O. Reynolds, W. Roberts, M.D., Prof. J. Thomson, and Prof. W. Turner.

ROYAL INSTITUTION.

June 4th.—G. Busk, Esq., Treasurer and V.P., in the chair.—Mrs. Warren De La Rue, Mrs. J. F. Moulton, Lord Gordon of Drumcarn, Messrs. W. A. T. Hallowes, C. R. Heap, and L. S. Long were elected Members.

INSTITUTION OF CIVIL ENGINEERS.

May 29th.—Mr. G. R. Stephenson, President, in the chair.—The paper read was, "On an Economical Method of Manufacturing Charcoal for Gunpowder," by Mr. G. Haycraft. The following candidates were elected, viz.: Messrs. D. Adamson, W. N. Blair, J. A. Coghlan, C. J. Homer, F. F. S. Kelsey, H. Laws, G. W. MacGeorge, W. H. Parker, J. Proctor, T. W. Rumble, H. C. Stanley, W. G. MacNeill Thompson, and J. Westwood, jun., as Members; and Capt. F. Firebrace, Capt. P. B. de Cerqueira Lima, Messrs. W. Y. Armstrong, W. P. Brodie, H. Chamberlain, E. Crofton, A. B. Cruse, J. Dawson, J. Galbraith, E. M. George, L. Groves, C. R. Hanson, W. Harker, C. L. Hett, G. B. Jerram, T. Kirk, H. Marsh, W. J. Maxwell, G. C. A. Melisurgo, R. Neville, J. Packman, W. P. F. Preston, F. H. R. Sawyer, E. I. Shadbolt, F. Stileman, J. P. Symes, H. O. Thomas, C. R. Walker, N. Watts, G. W. Webb, and G. Winstanley, as Associates.

SOCIETY OF ENGINEERS.

June 4th.—Mr. Thomas Cargill, C.E., President, in the chair.—The paper read was by Mr. R. H. Tweddell, "On Direct-Acting Hydraulic Machinery."

PHYSICAL SOCIETY.

May 26th.—Prof. G. C. Foster, President, in the chair.—The following candidates, Lieut.-Col. A. C. Campbell, Dr. H. Debus, Mr. W. T. Thiselton Dyer, Mr. W. Jack, and Capt. Sale, R.E., were elected members. Lieut.-Col. Campbell explained and exhibited a double slit which he has employed for measuring the distances between the lines in the spectrum, and finds of great service in cases where the illumination is so slight as to preclude the possibility of using the ordinary micrometer. One slit remaining stationary, the other can be moved at right angles to its direction by means of a very delicate micrometer screw of 200 threads to the inch, the graduated head of which is capable of distinctly indicating one five-millionth of an inch in the motion of the slit. If now a reading of the micrometer be taken when the slits are superposed and form one continuous slit, and a second reading, when any given line has been superposed upon any other line at a moderate distance from it, the difference between these readings will enable us at once to ascertain the distance between the lines, if the micrometer be calibrated in terms of the spectrum as seen in the observing telescope. The author has made several measurements with this apparatus, and finds it to be capable of extreme accuracy, but it is, of course, essential that the movable slit remains within a moderate distance of the axis of the collimator. He then described a simple arrangement for automatically fixing a prism, when placed on the table of a goniometer, at the angle of minimum deviation when different coloured rays are under examination. Mr. O. J. Lodge then read two papers, by Profs. Ayrton and Perry, jointly. The first contains an account of an elaborate series of experiments "On Ice as an Electrolyte." They state, as a result of their experiments, that the capacity per cubic centimètre of ice at – 13·5° C. is 0·002 microfarads, and the specific inductive capacity is 22,160 (that of air being called unity), while that of water at 8·7° C. is about 2,240 times this amount. Commencing with ice at 13·6° C. the temperature was allowed to rise, and the conductivity determined by galvanometer readings. From these a very regular curve was deduced, which shows that the conductivity increases regularly, and that there is no sudden rise in passing from the solid to the liquid state. The apparatus was also employed for determining the electromotive force of polarization currents at different temperatures by replacing the copper by a zinc dic. The second communication contained suggestions for experiments "On the Viscosity of Water and other Liquids."

June 9th.—Prof. G. C. Foster, President, in the chair.—The following candidates were elected Members: Messrs. W. H. Northcott and L. J. Whalley. Mr. S. P. Thompson read a paper "On Interference Fringes within the Nicol Prism." At the conclusion of the scientific business of the Society, a Special General Meeting was held.

MATHEMATICAL SOCIETY.

May 10th.—Lord Rayleigh, President, in the chair.—The following communications were made to the Society: "Note on the Correlation of Two Planes," by Dr. Hirst,—"On the Free Motion of a Solid through an Infinite Mass of Perfect Liquid," by Prof. H. Lamb,—"Generalisation of Cases of 5-bar Motion, considered at the April meeting," "The 'Kinematic Paradox,'" and "A Method of Solving by Linkwork $f(x)= o$, an Algebraical Equation of the nth Degree," by Mr. Hart. Mr. Kempe and Prof. Cayley spoke on the subject of these communications. Mr. J. W. L. Glaisher, Profs. Cayley and Clifford made short *impromptu* communications.

MICROSCOPICAL SOCIETY.

May 2nd.—H. C. Sorby, Esq., President, in the chair.—A number of donations to the Society were announced, including a sum of £500 presented by Mr. C. J. Lambert, from a bequest of £25,000 left by that gentleman's late father to be appropriated to benevolent and scientific purposes. The first of a series of Quekett Lectures, founded in honour of the late Prof. J. T. Quekett, was then delivered by Sir J. Lubbock, "On Some Points in the Anatomy of Ants." Commencing by reference to the occasion, and appropriately giving a short history of the life and labours of Prof. Quekett, the lecturer proceeded to describe in a minute and interesting manner the general structure and microscopic anatomy of these insects, pointing out the differences found to exist between individuals of different species and also between the various classes of the same species. Attention was specially drawn to the structure of the antennæ and to certain organs presumed to be those of hearing; also to the structure of the mouth, with its extensive muscles and mouth-sac. The lecture was beautifully illustrated by large coloured diagrams enlarged from microscopic sections, and by a number of well-executed drawings, which were laid upon the table. At the conclusion of the lecture the "Quekett Medal" of the Society, struck for the occasion, was presented to Sir J. Lubbock by the President.

June 6th.—Dr. R. Braithwaite, V.P., in the chair.—Six new Fellows were elected. M. l'Abbé Renard, of Louvain, was elected an Honorary Fellow. A paper by the Rev. J. Delsaulx, "On the Thermodynamic Origin of the Brownian Motion," was read by the Secretary, and described the observations of the author with regard to the motion of fluid in rock cavities, and molecular motion generally with a view to establish the theory that it was due to the action of temperature. The observations had been suggested by the study of Crooke's radiometer. A. letter from Mr. H. C. Sorby on the subject was also read to the meeting, and Mr. W. N. Hartley described his experiments, which led to the same conclusion.

QUEKETT MICROSCOPICAL SOCIETY.

May 25th.—H. Lee, Esq., President, in the chair.—Ten new Members were elected.—A paper, "On Improvements in the Ordinary Condenser," by Mr. W. K. Bridgeman, was read. It described the result of his investigations as to the best form of diaphragm to secure equal illumination of the binocular fields of view; he also exhibited specimens of a new tint of glass for use as a ground under strong glare of light.—A paper was also read, "On the Process of Staining Vegetable Tissues," by Mr. W. H. Gilburt, in which he minutely described the best methods of bleaching and double staining, and gave the results of his experience in the preparation and mounting of specimens so treated. A discussion on the subject elicited further information from members, and numerous objects in illustration of the value of the process were exhibited under microscopes.

ENTOMOLOGICAL SOCIETY.

May 2nd.—J. W. Dunning, Esq., V.P., in the chair.—Messrs. H. J. Adams, C. Adams, and J. W. Slater were elected Members.—Mr. J. Weir exhibited a large silken structure from the Cape of Good Hope, supposed to be a spider's nest. On being cut open it was found to contain, among other *débris*, the skin of a number of small spiders. Mr. Weir also exhibited a spider's nest from Montserrat, supposed to be worn as an ornament by the ladies.—Mr. F. Grut exhibited a large Chelifer from North Spain.—Sir S. Saunders exhibited a spider (*Atypus Sulzeri*) from Hampstead Heath, where it is found inhabiting tubes concealed under bushes in hedges. These tubes project about four inches above the ground, and extend about ten inches beneath the surface.—Mr. Champion exhibited a series of *Alaus Pareyssi*, from Thaso Island.—Mr. C. O. Waterhouse exhibited *Dohrnia miranda*, a Heteromerous beetle from Tasmania; also from the same region *Creophilus erythrocephalus* (one of the Staphylinidæ) and *Forficula erythrocephala*, these two last insects having some mimetic resemblance to each other.—Sir S. Saunders communicated a paper "On the Adult Larvæ of the Stylopidæ and their Puparia," and exhibited specimens.—The Secretary read a paper from Mr. H. W. Bates, "On *Ceratorhina quadrimaculata*, Fab., and Description of two new Allied Species,"

June 6th.—J. W. Dunning, V.P., in the chair.—M. R. Oberthür, of Rennes, France, was elected a Foreign Member. Mr. J. W. Douglas exhibited sixteen species of Psyllidæ, taken by him during the latter half of 1876. Four of the species were new to this country; and Mr. Douglas took the opportunity of calling the attention of the Members to the wide field for investigation offered by these insects. Mr. F. Grut exhibited a white downy nest from Jamaica.

Mr. H. Goss exhibited a dark variety of *Cleora glabraria*. Mr. C. O. Waterhouse exhibited a splendid new dragon-fly, belonging to the genus Gynacantha, from Borneo. The insect, which is more than six inches in expanse, it is proposed to call *G. plagiata*. The Secretary read a circular from Dr. B. White, of Perth, asking entomologists to assist him with Hemiptera, as he was engaged in working out this order of insects. Dr. Sharpe communicated a note on some species of Rhyncophorous Coleoptera, which were sent to Dr. Leconte for examination. Mr. Pascoe made some remarks upon the foregoing note. Mr. J. W. Slater communicated a paper "On the Food of gaily-coloured Caterpillars," in which he attempted to show that such larvæ generally fed on poisonous plants. Remarks were made upon this communication by Messrs. Dunning, M'Lachlan, Waterhouse, and the Secretary.

ASTRONOMICAL SOCIETY.

June 8th.—W. Huggins, D.C.L., President, in the chair.—The following gentlemen were elected Fellows:—Major-Gen. J. Baillie, Messrs. F. Brewin, G. Calver, J. Campbell, and W. F. Denning. The President mentioned that Mr. Stone, the Government astronomer at the Cape of Good Hope, had just issued a volume of very useful tables for facilitating the computation of star constants. He had received a letter, requesting him to announce to the Society that Mr. Stone would be happy to receive applications for copies from any astronomers to whom they would be of service. Mr. Marth explained some diagrams illustrating the triple conjunction of Mars and Jupiter, which will take place in the autumn of the present year. He also gave an account of the more important triple conjunctions which have taken place since the days of Tycho Brahe. In 1742-3 there was a conjunction of Mars and Jupiter, when the two planets came so close together that they must have appeared as one star, there being only 44″ between the two limbs. Mr. Gill explained an instrument for measuring any systematic error which might arise in his observations of the opposition of Mars from the want of sphericity of his eye. He said if a person draws a circle round a halfpenny, and endeavours to place a dot at the centre of the circle, he will very probably find, upon turning the paper upside down, that the place of the dot now seems to be either a little above or a little below the centre of the circle. The amount of this error differs with different observers. The instrument which he had prepared was to be observed from a distance with a heliometer; it enabled him to place a luminous point, first on one side, and then on the opposite side of a luminous disc. The artificial star is brought to the centre of the disc representing the planet, and the instrument is then reversed, and the error of the centering observed. He would thus be able to make the requisite allowance for any systematic error which might arise in his observations of the planet. The following papers were also read:—"On Collimating the Axis of Reversible Instruments, such as Equatorials, Transits, and Altazimuths, by testing for Parallax developed on Distant Scales," by Dr. R. Pigott; "Occultations observed at Windsor, New South Wales, in the year 1876," by Mr. J. Tebbutt, jun.; "Note on the Arc of Light seen round Venus in Transit," by Mr. R. A. Proctor; "Note on Some of Mr. Stephan's New Nebulæ," by Dr. J. L. E. Dreyer; "Description of Observatory at Higher Bebington, Cheshire," by Mr. R. C. Johnson; "Note on the New Inequalities in the Moon's Longitude, pointed out by Mr. Neison," by Prof. S. Newcomb; "On the Collective Light and Distribution of the Fixed Stars," by Mr. J. I. Plummer; "On Two 'Flats' on the Moon's Limb, observed March 23, 1877," by Lord Lindsay and Dr. Copeland. At the close of the Ordinary Meeting a Special Meeting was held, to consider some proposed alterations in the bye-laws. On the motion of Lord Lindsay, the consideration of the proposed amendments was deferred till the February meeting.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

June 5th.—S. Birch, D.C.L., President, in the chair.—The following candidates were elected Members: Baroness de Rothschild, Mrs. R. L. Warner, Rev. A. W. Hands, Rev. T. King, Rev. J. B. Smith, Messrs. E. A. Budge, T. W. Crawley, W. T. Elliott, J. Maccarthy, and J. H. Price. The following papers were read: "On a Collection of Babylonian Dated Contract Tablets," by Mr. W. St. C. Boscawen, British Museum, —"The Defence of a Magistrate Falsely Accused, from a Tablet in the British Museum," translated by Mr. H. F. Talbot, —and "On some further desired Aids to the Study of Assyrian," by the Rev. W. Houghton.

GEOGRAPHICAL SOCIETY.

May 28th.—Anniversary Meeting.—Sir R. Alcock, President, in the chair.—The Founder's Gold Medal, for the encouragement of geographical science and discovery, was awarded to Capt. Sir G. S. Nares, for having commanded the Artic Expedition of 1875-6, during which the ships and sledge-parties respectively reached a higher northern latitude than had previously been attained, and a survey was accomplished of 300 miles of coast-line, facing a previously unknown Polar Sea; also for his geographical services in command of the Challenger Expedition. The Victoria or Patron's Medal was awarded to Pundit Nain Singh, for his great journeys and surveys in Tibet and along the Upper Brahmaputra, during which he has determined the position of Lhassa and added largely to our positive knowledge of the map of Asia. The prizes to public schools for 1877 were as follows:—Physical Geography: Gold Medal, W. New, Dulwich College; Bronze Medal, A. S. Flower, Winchester College. Political Geography: Gold Medal, W. J. Newton, Liverpool College; Bronze Medal, J. Wilkie, Liverpool College. It was announced that the subject for the examination in 1878, both in physical and political geography, would be the Basin of the Nile, and that portion of Africa which lies to the eastward of it. The following gentlemen were elected as Council and Officers for 1877-78: President, Sir R. Alcock; Vice-Presidents, Major-General Sir H. C. Rawlinson, Sir H. C. Verney, Right Hon. Lord Cottesloe, and Admiral Sir A. Milne; Trustees, Lord Houghton and Sir W. C. Trevelyan; Sectaries, C. R. Markham and R. H. Major; Foreign Secretary, Lord A. Russell; Council, J. Ball, Hon. G. C. Brodrick, Sir T. F. Buxton, R. N. Cust, Sir B. Ellis, Capt. F. J. O. Evans, J. Fergusson, Sir T. D. Forsyth, F. Galton, Col. J. A. Grant, Major-General Sir W. H. R. Green, Sir J. H. Kennaway, W. Mackinnon, Admiral Sir F. L. M'Clintock, J. Murray, Sir R. W. Rawson, Admiral G. H. Richards, H. D. Seymour, T. W. Silver, General R. Strachey, and Col. H. Yule; Treasurer, R. T. Cocks. The following gentlemen were elected Fellows: General J. M. Read, Rev. Sir T. H. B. Baker, Rev. G. Brown, Messrs. W. Coates, F. J. Dean, C. E. Hamilton, W. A. Harrison, J. N. Hetherington, W. G. E. Macartney, H. T. Norton, R. Stewart, and J. L. Wynne.

GEOLOGICAL SOCIETY.

May 23rd.—Prof. P. M. Duncan, President, in the chair.—R. G. Coke, R. Slater, and W. Swanston were elected Fellows.—The President read a letter from Mr. C. J. Lambert, announcing that, out of the money left by his father to be distributed in gifts to scientific societies, he had allotted the sum of £500 to the Geological Society. The President further announced that the sum of £500 had already been paid to the society, and would be invested for its benefit. The following communications were read:—"Remarks on the Coal-bearing Deposits near Erekli, the ancient Hereclea, Pontus-Bithynia," by Rear-Admiral T. A. B. Spratt, —"On the Structure and Affinities of the Genus Siphonia," by Mr. W. J. Sollas,—"On the Serpentine and Associated Rocks of the Lizard District," by the Rev. T. G. Bonney,—and "On certain Ancient Devitrified Pitchstones and Perlites, from the Lower Silurian District of Shropshire," by Mr. S. Allport.

June 6th.—Prof. P. M. Duncan, President, in the chair.—The Rev. C. Leach, Messrs. W. May, J. W. Myers, and J. F. Pagen were elected Fellows. The following communications were read: "On the Rank and Affinities in the Reptilian Class of the Mosasauridæ, Gervais," by Prof. R. Owen,—"Note on the Occurrence of the Remains of Hyænarctos in the Red Crag of Suffolk," by Prof. W. H. Flower,—"On the Remains of Hypsodon, Portheus, and Ichthyodectes from British Cretaceous Strata, with Descriptions of New Species," by Mr. E. T. Newton,—and "On the Pre-carboniferous Rocks of Charnwood Forest," Part I., by the Rev. E. Hill and the Rev. T. G. Bonney.

PSYCHOLOGICAL SOCIETY.

June 6th.—Mr. Serjeant Cox, President, in the chair.—A letter from Mr. Croll, referring to his paper, "On Molecular Motion," explained his views of "matter." Reports of psychological phenomena were read. A paper was read by Mr. C. Bray, "On Automatic Mind." The adjourned discussion was taken on the paper reporting "Psychological Experiences."

PHILOLOGICAL SOCIETY.

May 18th.—*Anniversary Meeting.*—Mr. H. Sweet, President, in the chair.—The following officers were elected: President, H. Sweet; Vice-Presidents, the Archbishop of Dublin, E. Guest, W. Stokes, A. J. Ellis, Rev. R. Morris, and J. A. H. Murray. Ordinary members of Council, E. L. Brandreth, C. Cassal, C. B. Cayley, R. N. Cust, F. T. Elworthy, H. H. Gibbs, E. R. Horton, H. Jenner, Rev. B. Kennedy, R. Martineau, Rev. J. Mayor, W. R. Morfill, J. Muir, H. Nicol, J. Peile, C. Rieu, Rev. W. W. Skeat, E. B. Tylor, H. Wedgwood, and R. F. Weymouth. Treasurer, B. Dawson. Hon. Sec., F. J. Furnivall. The President delivered his annual address, containing reports by him on the work of the society in 1876-7, on English Philology, on Phonology, and on the Characteristics of English Philological work: and reports by Dr. Gallée, of Haar-on Dutch; by Dr. F. Tamm, on Swedish; by Prof. A. Leskien, on Lithuanian; by Prof. F. de Courteille, of Paris, on Turkish; by Prof. Hübschmann, of Leipzzig, an Armenian; and by Mr. R. N. Cust, on the Languages of the Indo-Chinese Peninsula and the Indian Archipelago.

ANTHROPOLOGICAL INSTITUTE.

May 8th.—J. Evans, Esq., President, in the chair.—On an exhibition by Mr. R. Biddulph Martin of objects from a large refuse-heap in the neighbourhood of Smyrna, Mr. Hyde Clarke, Col. Lane Fox, and the President offered remarks. Mr. A. L. Lewis communicated a description of the remains of a stone circle at Coldesham, Kent, illustrating his remarks by a well-prepared plan. Dr. J. Rae read a paper "On the Skulls of the Esquimaux," attributing the fact that two distinct types of skull exist among these people to an admixture of blood. A discussion followed, in which Dr. Beddoe, Col. Lane Fox, and others took part. Dr. Beddoe communicated a paper "On the Aborigines of Queensland," whom he described—on the authority of Mr. Christison, who had had many years' knowledge of them, and employed them largely in sheep-farming—to be, in many respects, not so black as they have been painted.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

MAY 16TH.—The Rev. S. M. Mayhew in the chair. A large collection of Roman remains, recently found at Sittingbourne, Kent, where exhibited and fully described by Mr. G. Payne. These consist of fictile vessels of great variety of texture and form, there being many specimens of Upchurch ware of the usual black colour, but the larger number being of reddish and light earth—all, probably, the manufacture of the district. Three charming glass flagons were also found and shown, and were much admired for their perfect condition and delicate fabric. Many personal ornaments were also exhibited. The whole series is the result of excavations in the neighbourhood of Sittingbourne, where the disturbance of the soil for brick-making has revealed the unexpected presence of Roman interments over a large area of country. Mr. Loftus Brock exhibited a large collection of Roman and mediæval pottery, recently found at a considerable depth beneath the present surface on the north side of Newgate Street. Some of the fragments of pottery, of very rough make, were pronounced to be of pre-historic date. Mr. C. H. Talbot minutely described the Saxon arches of Britford Church, recently opened, which, from their being formed with mortar having pounded brick, after the Roman manner. have been declared to be of Roman date. Dr. Stevens described a scold's bridle from Vernham, Hants, of novel form, having a lever beneath the tongue, with a rope workable by the leader of the unhappy victim during the period of her barbarous punishment. The Chairman showed some valuable glass of Roman date, found in London. The Rev. Canon Ridgway read an exhaustive paper "On the Temples and Worship of Baal with reference to similar Remains in England." The lecturer traced the rise of the worship of Baal in the East, and its spread to continguous countries, and went over the indications of its former present in Great Britain by reference to the names of places, the Baal fires, and numerous rites. Mr. G. Wright announced that the next Congress would be held at Llangollen. The names of many local supporters were announced and agreed to.

ARCHÆOLOGICAL INSTITUTE.

JUNE 8TH.—Lord Talbot de Malahide, President, in the chair.—A Special Meeting was held. A large assemblage of members and visitors attended, amongst them being the Duke of Argyll, the Lord Houghton, the Right Hon. W. E. Gladstone, Sir S. Scott, Sir W. Drake, the Archimandrite, the Greek Minister, the Hon. M. Mostyn, Karl Blind, Mr. R. Browning, &c. Mrs. Schliemann read a paper "On the High Culture of the Ancient Greeks; the Agents who contributed to it; the Reasons of its Decay; the Advantages of the Language of Plato; and, further, of the share the Authoress has taken in the Discoveries at Troy and Mycenæ." In speaking of the perfection attained in science, arts, poetry, &c., by her ancestors, Mrs. Schliemann referred in terms of enthusiasm to Homer as one from whom not only orators and statesmen, but painters, poets, and sculptors had freely borrowed some of their noblest ideas. The conclusion of the memoir consisted in an earnest appeal to the matrons of England to teach their children the language of Homer and Plato. Dr. Schliemann made some observations on the reasons for the high condition to which the Greeks had reached, and stated his belief that the English pronunciation of the Greek language was purely conventional, and that the ancient Greek was spoken with the modern Greek pronunciation a thousand years ago. Mr. Gladstone took up this part of Dr. Schliemann's argument, declaring that he was not a convert to the claims of modern Greek pronunciation as representing the Homeric. He protested also strongly against confounding accent with emphasis. The Greeks, he believed, had grown in their sense of colour, and might have grown, too, in their sense of sound. The unravelling of the mysteries of Greek mythology was still an unsolved problem. The real explanation of the greatness of Grecian art was the Greek custom of panting after a perfection to which they could never reach, and the profoundly religious idea which was the root of their national life. Thus arose a sublime ideality in literature, poetry, art, and politics. Dr. and Mrs. Schlieman he declared to be deserving of the highest eulogium for the energy and enthusiasm which characterised all their labours in Homeric archæology.

LINNEAN SOCIETY.

MAY 24TH.—Annual General Meeting.—Prof. Allman, President, in the chair.—After the Chairman's preliminary remarks, the senior Secretary (Mr. F. Currie) and the Treasurer (J. Gwyn Jeffreys) respectively read their annual reports. Among general items mentioned were that during the past year twelve Fellows and five Foreign Members had died, and that, on the other hand, forty-three fellows, three Foreign Members, and one Associate had been elected. Of active scientific workers whose loss the society had to deplore, J. S. Bowerbank, E. Newman, and A. Smee called for special mention; the labours of Bowerbank in the group of sponges marking an epoch in this branch of British natural history. A passing tribute was also due to the memory of the Foreign Members deceased; for Von Baer, Braun, De Notaris, Ehrenberg, and Hofmeister worthily represented biological science in its broad aspects. The society financially has made steady progress, and also in valuable additions to the library, and improvement in its scientific publications. The demise of the late Mr. C. Lambert has ensured the society a legacy of £500, to be devoted, without restrictions, to its best interests. The President and officers were re-elected by ballot, and the following gentlemen, viz., Lieut.-Col. Grant, Messrs. W. Carruthers, R. Hudson, Dr. J. Millar, and Dr. R. C. A. Prior, elected into the Council in room of an equal number retiring by rotation. The presidential address was "On Recent Researches among the Lower Sarcode Organisms."

METEOROLOGICAL SOCIETY.

MAY 16TH.—Mr. H. S. Eaton, M.A., President, in the chair.—Messrs. S. Bretton, J. G. Burgess, D. M. Home, and F. G. Tippinge, were elected Fellows.—The following papers were read: "An Improved Form of Mercurial Barometer," by Mr. R. E. Power. The improvement consists in the use of a double column of mercury, so that, in the event of a vacuum being formed by the escape of some mercury into the cistern, the shock is no longer felt by the tube, but in the first place is received by the mercury alone, and then reflected, much diminished, into the cistern, where it is modified by the presence of the atmosphere. At the same time, owing to the peculiar construction of the cistern, the probability of any mercury leaving the tubes in much less than in the case of the standard barometers at present in use. It is also believed that the employment of the double tube will do away with the necessity of boiling the mercury. "The Relation between the Upper and Under Currents of the Atmosphere around Areas of Barometric Depression," by the Rev. W. C. Ley. This paper gives a description of the mean directions of the movement of cirrus clouds over the different segments of areas of depression. The subject is treated on its observational side, as it is not yet considered ripe for much theoretical discussion, but one or two points seem likely to throw some light on the theory of the movements of the atmosphere. "Contributions to the Meteorology of the Pacific; the Island of Rapa," by Mr. R. H. Scott. Rapa is a small island, eighteen miles in circumference, in the South Pacific, in latitude 27° S. and longitude 144° W. The observations were made by Capt. D. E. Mackellar, on board the depôt ship *Medas*, during the period extending from December 15th, 1867, to May 27th, 1869. The climate appears to be an equable one.

ZOOLOGICAL SOCIETY.

MAY 15TH.—Prof. Mivart, V.P., in the chair.—The Secretary read a Report on the additions that had been made to the Menagerie during the month of March, and called particular attention to a Ceylonese Fish Owl (*Ketupa Ceylonensis*), from Ceylon, presented by Capt. H. B. Turner; a female antelope of an uncertain species, transmitted by the Sultan of Zanzibar along with other animals to the Prince of Wales, and deposited by H. R. H. in the Gardens; a Pigmy Marmozet (*Hapale pygmœa*), purchased April 27th, and stated to have been obtained at Pebas on the Upper Amazons; and two Yellow-thighed Parrots (*Caica xanthomera*), new to the collection, received along with the marmozet from the Upper Amazons. Mr. Sclater made remarks on the progress and condition of the Zoological Gardens of Rotterdam, Amsterdam, Antwerp, Brussels, and Ghent, which he had just visited. Letters and papers were read: from Mr. G. S. Brady, on the fossil Ostracoda of the Antwerp Crag,—from Dr. F. Day, on the capture of a specimen of *Coregonus oxyrhynchus* on the coast of Lincolnshire,—from the Marquis of Tweeddale, containing a memoir on the Birds of the genus Batrachostomus; the author came to the conclusion that there were seven recognisable species of this difficult group inhabiting the Indian region, one of which, yet undescribed, was from the Philippines; and the rule appeared to be that the females were rufous from the nest, while the males are brown and sometimes spotted,—by Mr. E. R. Alston, on a Shrew, from Gautemala, which had been indicated without being characterised by the late Dr. Gray, and for which the name of *Sorex veræ-pacis* was now proposed,—by Mr. A. H. Garrod, the second portion of a series of papers on the Anatomy of Passerine Birds, —from Mr. T. E. Buckley, containing additional remarks on the past and present geographical distribution of the larger Mammals of South Africa.

NUMISMATIC SOCIETY.

MAY 17TH.—J. Evans, Esq., President, in the chair.—Messrs. A. E. Copp and T. K. Ford were elected Members. Mr. Evans exhibited a rare coin of Maximinus Daza, struck in memory of Maximian; also an extremely rare silver coin of Carausius, with the legend EXPECTATE VENI. Mr. Vaux exhibited two gold coins of Kashghar, issued by the ruler of that place, in 1873-4, with the name of Abd-al-Aziz, probably referring to the late Sultan of Turkey, and in recognition of his position as Suzerain. Mr. H. S. Gill read a paper "On Seventeenth Century Somersetshire Tokens not described in Boyne's Work." Mr. R. W. Cochran-Patrick communicated some notes towards a Medallic History of Scotland, comprising descriptions of several rare and hitherto unattributed medals. Mr. J. P. Six, of Amsterdam, communicated a paper entitled "Observations on Phœnician Coins," in which he traced the numismatic history of each of the principal cities of Phœnicia from the commencement of a Phœnnician coinage, placed by M. Six in the fifth century B.C., down to the time of its final extinction by the Romans.

PHOTOGRAPHIC SOCIETY.

May 8th.—J. Glaisher, Esq., President, in the chair.—The discussion on the "Nitrate Silver Bath," which had occupied three evenings, was closed by Mr. J. Spiller (who had introduced the subject) reading his reply. A paper was read by Capt. Abney, "On some further Experiments with Alkaline Development."

ASIATIC SOCIETY.

May 14th.—Sir E. Colebrooke, President, in the chair.—Mr. N. B. E. Baillie read a paper, entitled "Is the Sultan of the Turks the Caliph of the Musulmans and the Legitimate Successor of the Prophet?" in which he examined at considerable length the admitted authorities on this question, especially Maverdy, and came to the conclusion that, on the taking of Baghdad by Tatars in A.D. 1258 and the overthrow of the Abbasside House, the Caliphate became vacant, and that the story of a certain Ahmed, who is said to have been recognised by Bibars, the Mamlook Sultan of Egypt, cannot be relied upon as satisfactory evidence, and, further, that there is no proof that, in any such recognition, the usual rules whereby the succession to Mohammed had been originally regulated, were adhered to.

CHEMICAL SOCIETY.

May 17th.—W. Crookes, Esq., V.P., in the chair.—The Chairman announced that an Extraordinary General Meeting would be held on May 31st, at 8 p.m.—The following papers were read: "On a Slight Modification of Hofmann's Vapour-Density Apparatus," by Messrs. M. M. P. Muir and S. Suguira. The authors propose to omit the india-rubber plate of the original apparatus, and mark off the height of the mercury by a cathetometer and a slip of gummed paper. "Note on the Fluid contained in a Cavity in Fluorspar," by Mr. J. W. Mallet. The cavity was 6 mm. by 2·5 mm. by 1 mm.; it contained water and a bubble; on heating, the bubble became less mobile, and the crystal showed signs of incipient splitting. "Examination of Substances by the Time Method," by Mr. J. B. Hannay. The author has determined the loss sustained by various hydrates in equal successive intervals of time when submitted in a Liebig's drying tube to a current of air at various temperatures, and thus obtains evidence of the existence of hitherto unknown hydrates. Magnesium sulphate, when treated as above, loses 8 per cent. of water, at 100° C., in five minutes; the loss is then much slower and regular up to 29 per cent., when the rate of loss decreases somewhat suddenly, from the formation of a lower hydrate, which loses water much more slowly. "On the Dehydration of Hydrates by the Time Method," by Mr. W. Ramsay. "On the Transformation of Aurin into Rosaniline," by Messrs. R. S. Dale and C. Schorlemmer. By heating sulphuric acid and pure phenol, and gradually adding oxalic acid, pure aurin is formed; by the action of ammonia on aurin, red aurin is produced, which, by the action of alcoholic ammonia at 150° for several days, is converted into rosaniline. The authors consider aurin to be identical with rosolic acid. "On certain Bismuth-Compounds, Part VI.," by Mr. M. M. P. Muir. The author describes the preparation, &c., of hypobimuthous oxide, bymuthous oxychloride, and oxybromide, and sulphbismuthyl chloride. "On the Theory of the Luminous and Non-Luminous Flame," by Mr. J. Philippson. The author states what he considers to be the causes of the luminosity or non-luminosity of flames.

SOCIETY OF ANTIQUARIES.

May 31st.—The Earl of Carnarvon, V.P., in the chair.—Mr. C. T. Newton read a paper "On the Antiquities of Mycenæ," which he illustrated by specimens of pottery from Rhodes, and by diagrams of the patterns found on other pottery from that island. Mr. Newton began by referring to a lecture on Dr. Schliemann's discoveries at Hissarlik which he gave to the Society some years ago. In that lecture he instituted a comparison between the Hissarlik antiquities and the earliest Hellenic antiquities extant in museums, with a view of finding, if possible, some points of resemblance and connecting links. He failed to discover any such connecting links. The Hissarlik antiquities were so unlike the antiquities of what we usually call the Archaic Greek period, that we must consider them as certainly non-Hellenic, and very possibly pre-Hellenic. He proposed to pursue the same method of inquiry now. Before entertaining the question whether the tombs discovered by Dr. Schliemann on the Acropolis at Mycenæ can be probably identified with the five tombs which local tradition pointed out to Pausanias as those of Agamemnon and his companions who were murdered by Ægisthus, it would be well to inquire whether the antiquities found by Dr. Schliemann resemble any already extant in museums. And coming fresh from an examination of Dr. Schliemann's antiquities at Athens and Mycenæ back to the British Museum, Mr. Newton was struck with the resemblance between certain antiquities from tombs at Ialysus, in Rhodes, with certain antiquities found in the tombs on the Acropolis at Mycenæ. It was the object of the present paper to draw attention to these resemblances, and, so far as possible, to demonstrate them by the aid of diagrams of objects in the British Museum, and photographs kindly lent on this occasion by Dr. Schliemann. The Mycenæ antiquities, some of which are to be compared, consist principally of gold objects, fictile vases, terracottas, and an opaque vitreous composition. The gold objects again consist partly of personal ornaments, and partly of cups and other objects of domestic use. It has not been possible, on the present occasion, to illustrate all the points of resemblance by diagrams, but only those which admit of being drawn on a large scale. To make a complete comparison it would be necessary to place side by side a number of small objects from Mycenæ on the one hand, and from the British Museum on the other. Thus we find that certain small ornaments, probably pendants of necklaces, executed in gold at Mycenæ, are similar in character to certain antiquities from Ialysus, with this difference, that the Ialysus personal ornaments are made not in gold but in an opaque vitreous paste. Again, at Mycenæ were an immense quantity of circular discs of thin beaten gold, on which was impressed, from a mould, some device, such as a butterfly, cuttlefish, a flower. All these discs have been fastened on some surface underneath, as the holes for the pins remain. At Ialysus we have discs similar, but on a smaller scale, also a winged monster embossed on a thin gold plate, very similar in style to the *repoussé* work in gold at Mycenæ. But, to pass to resemblances which can be illustrated by diagrams. The form of the gold cups at Mycenæ is peculiar. There are two dominant types. Both these types prevail in the fictile vases from Ialysus. Here Mr. Newton showed the forms of these two kinds of cups by diagrams and photographs. It should be noted that these two shapes which occur at Mycenæ and Ialysus do not occur, so far as Mr. Newton knows, in later Greek art at all, and one of them he has only seen at Ialysus and Cos. The shape of this cup, which has a long stem rising from the foot, was probably originally a Ceramic type, and was afterwards copied in metal. But the resemblance between the gold antiquities of Mycenæ and the fictile ware of Ialysus is not limited to the forms of the cups. The pattern of one of the Ialysus cups shows dolphins running round it, and below a row of birds. Both these patterns occur on Mycenæ gold cups. Again, one of the prevalent types at Ialysus is a cuttlefish, as in the diagram before the Society. This animal is a favourite symbol on the gold embossed discs of Mycenæ already alluded to. On surveying the gold objects of Mycenæ, we see that the characteristic of the ornaments generally is a tendency to spirals, not treated severely as in later Greek art, but spread over the surface of the object decorated with a certain vague lawlessness. This, again, is quite the character of the ornaments of the fictile vases of Ialysus, as illustrated by the examples before us. To pass now from the gold objects of Mycenæ to the fictile ware, we find both in the fabric and the design of that ware a striking resemblance to the Ialysus pottery. Mr. Newton here referred to a diagram of an Ialysus vase, to some fragments of Mycenæ pottery, and to photographs of such fragments. One shape of vase which was found at both places was deserving of special attention, because this peculiar type of vase has been found at Athens, in Cyprus, at Memphis, and also is represented in an Egyptian painting. In digging down to the graves on the Acropolis, Dr. Schliemann found a number of small terra-cotta figures, which he calls idols, representing the ox-headed Hera. A precisely similar figure was found at Ialysus, of which a diagram was exhibited. Mr. Newton does not agree with Dr. Schliemann in thinking those idols represent such a type. What Dr. Schliemann calls horns are merely the arms extended on each side. Another diagram exhibits similar figures from Ialysus, in which the arms are differently composed. At the same time, it may be that the silver cow's head found at Mycenæ may be a symbol having reference to the myth of Io, the victim of the persecutions of the Argive Hera. Very little glass was found either at Mycenæ or at Ialysus. What little there was, was in the form of small ornaments in a dark, opaque, vitreous paste. At Mycenæ were found four rudely cast intaglios, on lintoid stones. Impressions from similar gems found at Ialysus were exhibited. Such gems come from several islands in the Archipelago, and are probably among the earliest efforts of Greek art. The intercourse between Mycenæ and Egypt was proved by the occurrence among the antiquities from the tombs there of ornaments of an Egyptian character in Egyptian porcelain. At Ialysus was found an ivory box, with a peculiar lid, in the form of a duck, which was entirely Egyptian, also a porcelain scarab, with the cartouche of Amenoph III., whose date, according to Egyptologists, cannot be later than B.C. 1130. This date comes very near the date generally assigned for the downfall of the dynasty of the Atridæ. Of course, it is quite possible that the remaining antiquities found by Dr. Schliemann may be of a later date, but the indication is worthy of note. Among General Cesnola's antiquities from Curium in Cyprus were cylinders bearing the names of very early Assyrian kings. Mr. Newton then alluded to the mythic connexion between Ialysus and Argos through Tlepolemus, also to the earliest legend connecting Ialysus with Cadmus, Danaus, and the Phœnicians. Having pointed out the resemblance between the antiquities of the two places, both of which are sites with claims to high antiquity, Mr. Newton passed on to consider the theory of Dr. Schliemann, that the graves discovered by him may be the five graves mentioned by Pausanias. Dr. Schliemann seems to be of opinion that the tombs had been originally on a lower level than that on which several of them were found. He thinks also that the circular enclosure within which he found these tombs may have been set up at a later period, when it was an object to mark this spot as sacred. In this opinion Mr. Newton concurred, and he further suggested that the enclosure may have served as the place of meeting of a senate, and the round form would correspond with the usual form of a prytaneum. If we suppose the antiquities found in the tombs within this circle to be of the period assigned to them by Dr. Schliemann, then it may be assumed that they are later than the so-called treasuries outside the Acropolis. A different kind of pottery is found in the entrance to the treasuries, which, from the character of its ornament, may be called geometrical pottery. Is this geometrical pottery, then, earlier than the pottery from the tombs on the Acropolis? Mr. Newton thought not. He believed that the so-called treasuries were tombs, and that the geometrical pottery is of a later date, and that it was brought as an offering to these tombs and there deposited. He exhibited specimens of this pottery and also of the next in Asiatic style, hardly a fragment of which was found at Mycenæ. In conclusion, Mr. Newton said that, as the demonstration by means of diagrams was necessarily imperfect, he had arranged the Ialysian antiquities at the British Museum in such a manner that they might be conveniently studied by visitors. The fictile vases so frequently referred to in this lecture were arranged in immediate juxtaposition with those from Camirus, and those from Athens and the islands, while in the adjoining room might now be seen the earlier fictile vases from Cyprus. He regretted that, in order to accomplish this arrangement, he had been obliged to displace, and stow away out of sight, two important groups of early fictile ware. Such constant derangements and displacements of portions of the collections previously arranged are now inevitable at the British Museum, and he regretted to say that there was no prospect, for years to come, of such increased accommodation as the collections required. Such lamentable chaos as resulted from this want of space might be nobody's fault, and excellent official reasons why things should be in this state might be forthcoming. But then he ventured to repeat what he had said publicly about seventeen years ago, in reference to the same subject, that, if such a state of things was nobody's fault, it was everybody's fault. It was the indifference of the public to the scientific purpose of such institutions that was the real cause why museums were not developed more adequately.—An interesting discussion followed, in which Messrs. W. Lloyd, P. Gardner, W. Simpson, Dr. Schliemann, and Dr. Meyer took part. — Lord Carnarvon gave a brief summary of the various points which had been raised by Mr. Newton, to whom a vote of special thanks was awarded by acclamation.

SWEDENBORG SOCIETY.

THE Annual Meeting of this Society was held at the Society's House, 36, Bloomsbury-street, London, W.C., on the 19th inst; the Rev. Dr. Bayley, of Kensington, occupied the chair.—The report of the Committee states that 4,888 vols. of the "True Christian Religion" and 4,755 vols. of the "Apocalypse Revealed" have been presented gratuitously to ministers and students, and 369 vols. of the latter work to editors of the Press, from the time the offer of these works was first made up to the 30th May. The sales of the same works for the year are 465 vols. of the former, and 633 vols. of the latter. Of the general publications of the Society, 3,319 vols. have been sold and 3,151 presented, making a total of 6,470 vols. issued during the year. The operations of the Society during the last ten years are thus summarised:—1868 to 1877, income (from all sources), £8,488; 1868 to 1877, works sold and presented 41,637. Of two works alone, viz., the "True Christian Religion" and "Apocalypse Revealed, the sales for the same period are stated to be 4,732 vols. of the former, and 1,204 vols. of the latter, showing an increase of nearly four-fold over previous sales of these works. Several extracts from reviews of the two works just mentioned are given, but our space will only permit of one of the "Apocalypse Revealed" being quoted here. "After volumes upon volumes have been written on streets paved with gold, and thrones tending to impart a physical idea of a future state; on beasts and dragons, as referring to earthly potentates, or to the hierarchy of hell; and the scarlet lady as being applicable to the Church of Rome and the Pope, it is truly refreshing to find a more elevated expression of such terms, persons, and things, which Swedenborg shows to be purely allegorical, and to have entirely a spiritual meaning. What that meaning is appears very distinctly and comprehensively described in this volume." Referring to the works of Swedenborg generally, one reviewer writes that "The misfortune has hitherto been that prejudice has prevented the writings of a man who lived in advance of his times being fairly treated. The principles of Swedenborg are preached every Sunday by men who do not know the fact. *Abroad.*—In Italy a fourth work, the "Divine Love and Wisdom," in Italian, has been published under the auspices of the Society, and preparations are being made for a translation of the "Heaven and Hell" into Polish. The "Apocalypse Revealed" is already partly translated into Swedish. The second and concluding volume of the "Documents" is completed, and will shortly be in the hands of the subscribers. The importance which the publication of these "Documents" acquires is the fact that they supply authentic intelligence respecting many of the particulars of Swedenborg's life and character, which at the present time are much misrepresented, creating a prejudice against the writings of this remarkable man. The report was unanimously received and adopted, and the following resolution carried *nem. con.*:—"That the extended knowledge of earthly things which has been supplied to the human mind in modern times by scientific researches which have no parallel in the past, points to the necessity of a corresponding increase of spiritual knowlege as its complement required by the hunger and thirst of the soul. And, as the Lord has vouchsafed to this Society the possession of the literature containing the heavenly truths the case demands, it is plainly the duty of each member to proceed vigorously and continuously in its dissemination."

IMPROVED WHALING GUN.

DURING last year, Captain Eben Pierce, the well-known manufacturer of bomb-lances, and Selmar Eggers, after much planning and experimenting, perfected an invention which is destined to prove vastly beneficial to our community in swelling the revenue accruing from the whale fishery. This is a breech-loading whaling gun, varying from the ordinary weapon as much as a modern sixteen-shooting rifle does from the flint-lock shot gun of our ancestors.

The weight of the gun is 18lbs., or nearly the same as the old style, while it is much better balanced and proportioned, reducing the comparative weight of the barrel that renders it so difficult to steady and aim the ordinary guns. The length and base of the barrel is the same, admitting the use of the usual size bombs. The great superiority of this weapon lies in the manner of loading. The old guns were loaded with loose powder, and were more dangerous to handle when charged; the powder would also become dampened with flying spray when in a boat that was going through the water at a lively rate, and it has often occurred that, when the pursuers had arrived within easy range of their prey, they would find the charge moistened and the weapon consequently useless. Mr. Eggert's gun is so constructed that, by touching a spring in the butt, a chamber in which the barrel terminates is opened; in this a cartridge with a seven-eighths inch copper shell is inserted, charged with 2½ drachms of powder, or about half the quantity required to load the ordinary guns. The chamber is then closed upon pulling the trigger, the hammer strikes a sharp blow upon a cap in the end of the cartridge, and the piece is discharged. The whole operation of loading, fixing, and reloading can be accomplished in two minutes' time. It will be seen at once that the gun is much surer and safer, as these cartridges can be kept in the pocket until needed; and no water can lessen their power after they are placed in the chamber. With the breech-loader a lance can be sent with destructive effect over 750 feet when fired at slight elevation. The weapon is constructed of gun metal, and thus is almost impervious to wet, another weakness to which the old style gun was susceptible.—*New Bedford Mercury*.

AERONAUTICS.

W. E. Abbott, writing from Murrurundi, N.S.W., to the *Scientific American*, says:—

"I have noticed in some of your recent issues several articles on flying machines. The subject is one in which I have taken a great deal of interest; and as the conclusions at which I have arrived differ altogether from those of your correspondents, it is just possible they may give a new direction to the discussion.

"I believe the invention of a machine, to fly by acting mechanically on the air, as birds do, is simply impossible if the machine, with its load, weighs more than 50 or 60 lbs. I do not say that a machine of any weight may not be constructed which shall be just a little heavier than the air displaced, and then the machine may be raised mechanically by acting on the air; but such a machine will, for reasons which follow, be little, if at all, better than a balloon. That which enables a bird to fly is the support which the pressure of the air gives to the bird's body. This support depends, I think, on the proportion between the weight and the surface exposed to the air. If the size of a bird is increased, all other things being equal, the weight increases in a greater ratio than the surface exposed to the air; so that, if with a certain amount of wing area and muscular power a bird weighing 10 lbs. could fly well, and his weight were increased to 30 lbs., with muscular power and wing area increased in the same proportion, he could not fly at all. Or if an eagle grew as big as an elephant, he could no more fly than the elephant. Let us suppose that a bird of 10 lbs. weight is a perfect flying machine. Our object is to increase the size of the machine and keep the same perfection of parts. If the weight is doubled, keeping the same proportion of all the parts and using the same material, we will find that the muscular power has not quite doubled, and the supporting surface exposed to the air has not increased in anything like the same proportion; so that a limit is soon reached where the machine ceases to have any power of flight, and that limit, where muscular force is the power used, I take to be about 30 lbs. This accounts for the fact that all the largest birds are not fliers. The ostrich, the emu, and the moa ceased to be flying birds as soon as they grew beyond a certain size, which size was determined by the proportion between their weight and the surface exposed to the air. Geology also shows that, while mammals and reptiles grew in past ages to enormous sizes, no flying animal ever appeared much larger than those now existing.

"In this way only is it possible to account for the fact that small particles of iron or steel dust will float for a long time in the air. Of course each particle is as much heavier in proportion than the air as if it were a solid cube several inches in diameter. This also accounts for the fact that the wing area in small birds is not nearly so large, in proportion to weight, as in the larger birds; and the wing area in proportion to weight is still further diminished in many insects, such as the common bee and many of the beetle tribe. I have seen some small animals in this country, such as the opossum and the rock wallaby, fall 50 feet on a solid rock without injury; and this first set me speculating on the why. A bullock falling under the same circumstances would have been crushed, bones and all, to a shapeless mass; and yet the wallaby is not more strongly made than the bullock. I have stated my views as shortly as possible, and if I have not made them plain to general readers, I trust some mathematician among your correspondents may take the matter up and show that according to well known mathematical laws flying (as birds fly) is impossible for men."

"Moonlight Trips on the Thames."—The success which attended these evening excursions to Gravesend and back last season has induced the London Steam Boat Company to place at the service of the promoters of these trips one of their large saloon steamers. The commencement of the season took place on Saturday, June 23, after which they will be run every Monday, Wednesday, and Saturday during the summer.

CHRONOLOGICAL LIST OF
APPLICATIONS FOR LETTERS PATENT.

⁂ In this list (Com. means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur-street, Charing Cross.

On October 17th.—4000 to 4012.—J. E. Bullock. Skimmer attachments to plows (com.)—J. Ledger. Ship building for life-saving purposes (com.)—J. R. Penning. Apparatus for indicating the pressure of elastic or non-elastic fluids.—S. Danischewski. Machine for obtaining and applying motive-power.—D. W. Fessey. Heel plate for boots and shoes.—J. Baur. Manufacture of steel.—N. B. Downing and J. E. Hughes. Apparatus for use in evaporating alkaline solutions (com.)—J. Grason. Self-locking shirt stud, applicable also for other fastening purposes.—J. Wakefield. Dies and machinery for pointing or tapering metallic rods for wire-drawing, and for pointing or tapering other articles.—T. Smith. Manufacture of the fingers of reaping and mowing machines, and in dies or tools to be used in the said manufacture.—W. Morgan-Brown. Manufacturing new and improved blanks or stock for screws and threaded nails, and in machinery for that purpose (com.)—T. W. Harding. Machinery for the manufacture of circle combs, gill combs, gills, hackles, porcupines, and other similar articles, and of the steel pins used therein.—W. G. Blogg. Locks.

On October 18th.—4013 to 4032.—W. Taylor. Ventilating iron, steel, wood, composite, or other decked vessels or floating bodies, and in the construction thereof.—J. Howard, A. F. Wilson, and H. W. A. Kingdom. Apparatus for controlling and arresting the flow of fluids and prevention of waste of water.—E. Reynolds. Centrifugal pumps and fans.—T. Black. Safety valve.—A. Turnbull. Safety valves.—B. Hunt. "Sadirons" and machinery or apparatus for grinding the same.—E. A. Berger. Cricket Bats.—R. A. Wilson. Furnaces for steam boilers and other purposes.—T. Barrow. Method of and apparatus and appliances for consuming smoke and condensing gases and noxious vapours; parts of which improvements relate to a construction of steam boiler to be used therewith, or independently.—T. Shutt. Metal heel tips or plates for boots and shoes.—H. Cherry. Machinery for the manufacture of welded iron and steel chain.—A. H. Wildy. Construction of and mode of working elevated railways, and in rolling stock for the same.—J. Williams. Cylinders, and valves for use with the same.—T. Hyatt. Chest protector for persons of weak lungs, the same being also applicable as a respirator and as a protector to other parts of the person (partly com.)—T. C. Clarkson. Manufacture and application of pontoons, boats, barrels, cartridge and other cases, for the use of the milltary, naval, mercantile, marine, and civil purposes.—E. A. Roy. Construction of sea-going vessels specially designed to prevent or lessen sea sickness.—W. R. Lake. Breech-loading fire arms (com.)—A. Mosley. Twist lace machines, and a special arrangement of threads for the production of imitation "guipure" in twist lace machines.—W. Birch. Squeezing machines.—R. Henderson. Tap for measuring, regulating, registering, ventilating, and preventing the waste of fluids and liquids.

On October 19th.—4033 to 4050—G. Lowry. Roller skates.—A. Aubert. Screw popellers.—C. Courtot. Apparatus for transmitting acoustic signals.—A. E. Vandendriesche. Gas regulator designed for the purpose of being applied to burners of every description without altering the original appearance of the fittings.—G. Green. Mounting electro-plate wares, such as waiters, side-dishes, "butters," cake baskets, and other articles of a similar kind.—G. Green and J. Mallol. Revolving dishes and revolving butter coolers and other similar articles.—A. S. Wild and G. Chadwick. Pickers employed in looms for weaving and in the method of forming the same.—T. P. Richards. Circular sawing machinery.—B. Beer. Apparatus to be employed in drawing or depicting objects or scenes (com.)—W. Thorburn. Washstands.—W. R. Lake. Apparatus for catching fish or game (com.)—W. R. Lake. Street pavement (com.)—J. Darlington. Percussive rock-boring machines.—W. H. Ridgway. Manufacture of encaustic tiles and other like articles, and machinery or apparatus employed therein.—F. Gardner. Apparatus to be fitted in or to vessels for preventing sickness at sea.—G. E. Davis. Treatment of phosphates of alumina or phosphates of alumina and iron, for the purpose of obtaining useful substances therefrom.—J. Oppenheimer. Pendulums for time keeping apparatus.—H. J. Brookes. Machinery for manufacturing metallic nuts.

On October 20th.—4051 to 4064.—E. G. Law. Double-action sashes.—W. A. Carter. Incinerating furnaces.—E. T. Brewer, Shive-drawer.—R. J. Hutchings. Cleansing, purifying, or revivifying the spent acid or chemical compositions or materials used for pickling metal plates, and in apparatus therefor.—J. Fletcher. Buttons.—A. Tylor and J. J. Tylor. Apparatus and arrangements for measuring and recording the movements, speed, and quantity of substances, liquids, and fluids, such as water, spirits, and air, or of fine powders, such as flour, which improvements and arrangements are applicable for measuring and recording other velocities, and also depths of water.—L. Binns. Manufacture of cords and ropes.—E. F. Kelly. Portable folding musical instrument.—W. E. Gedge. Boots and shoes (com.)—W. E. Gedge. Portable photographic apparatus (com.)—W. H. B. Winchester. Roller blinds.—T. W. Helliwell. Method of and apparatus for fastening window sashes.—F. Wilkinson. Machinery for carding cotton and other fibrous materials.—J. C. Buckley. Looms and jacquards.

On October 21st.—4065 to 4082.—W. R. Lake. Harvesting machines (com.)—W. R. Lake. Harvesting machines (com.)—W. A. Simmons. Printing checks and other documents for the prevention of fraud, applicable to other printing purposes.—W. E. Gedge. Preservation of animal matter for food, applicable also to the preservation of other perishable substances (com.)—H. W. Walker. Treating and utilising residual liquids obtained in manufacturing or refining sugar.—S. Alley. Sluice and other valves, and machine tools for making them.—E. Schlenker. Screw-cutting and nut-tapping machine.—J. Hinks. Lifts for hotels, warehouses, and other places.—R. Ramsey. Buffer hoops for pit tubs, railway trucks, waggons, and other vehicles.—G. Evans. Construction of floors and roofs of great strength and simplicity, and possessing perfect fire-proof properties.—G. Fahnehelm. Explosive compound.—J. Batley. Boots and shoes, and apparatus for lasting and treeing boots and shoes.—R. Wagstaff. Construction of chimney tops and ventilators.—W. Morgan-Brown. Injectors or inspirators (com.)—E. Smith. Folding and adjustable chairs (Complete specification).—A. M. Clark. Newspaper printing and folding machinery (com.)—H. Gardner. Apparatus connected with submarine telegraphy (com.)—W. R. Lake. Machine for pasting, cutting, folding, and pressing the edges of shoe-vamps, and for other like purposes (com.)

On October 23rd.—4083 to 4103.—J. France. Winding and folding yarns, and machinery or apparatus employed therefor.—T. Nordenfelt. Electric railway signalling, and the effects thereof (com.)—J. C. H. Sievier. Manufacture of gas, and apparatus to be employed therein.—D. Drummond. Braking apparatus for railway trains.—J. T. King. Chandeliers, brackets and bracket arms, and apparatus employed in the manufacture of the same (Complete specification.—G. Walton. Stretching boots and shoes (Complete specification).—W. Balcon. Lamp-lighter.—C. Pieper. Grain cutting machinery (com.)—C. Pieper. Transmission of rotary motion.—G. Murray. Locking the nuts on bolts.—J. L. Haddan. Despatch tubes.—H. J. Haddan. Coal and ash sieves (com).—G. T. Burden. Meters for measuring water and other liquids.—E. Gittins. Kilns for burning bricks and other moulded articles of clay.—T. Whitehead and H. W. Whitehead. Drawing and holding rollers for fibrous substances.—C. Pieper. Musical instruments (com.)—W. A. Brodribb. Cleaning streets and apparatus connected therewith.—W. R. Lake. Harvesting machines (com.)—E. Simon. Machines for the manufacture of lace, especially applicable to the system known as Malhère's (com.)—E. De Pass. Apparatus for obtaining and applying motive power (com.)—A. M. Clark. Artificial flowers, leaves. foliage, grasses, and fruit (com.)

On October 24th.—4104 to 4116.—B. Tower. Apparatus for indicating the speed of marine engines.—W. Watts. Attachment to skates to indicate the paths of traverse.—S. Leoni. Construction of boilers to be heated by gas.—A. Sauvée. Combination in the modes of treatment of ozokerit, by means of which the yield in paraffin or in ceresine is considerably increased.—T. Jeffery. Machine for cutting and splitting wood.—J. Walker. Fluid meter.—W. L. Wise. Wire taste, sometimes denominated ribbon wire, cap wire, or three-wire ribbon.—J. H. Johnson. Manufacture of sugar and the apparatus employed therein.—J. H. Johnson. Treating animal and vegetable subsubstances with hydro-carbons, and in treating extracts obtained from such substances so treated.—H. Hughes. Apparatus for regulating and controlling the speed and motion of locomotive engines.—J. McWinnie. Indicating distances travelled by railway carriages, tramway cars, omnibuses, and other vehicles, the same being applicable for delivering tickets, and checking the fares received by the conductors of such vehicles.—E. Simcox. Manufacture of taps and cocks.

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